UNEARTHING THE DETERMINANTS REQUIRED FOR OFF-GRID SUBSISTENCE: A CASE STUDY

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Declaration

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ABSTRACT

This study is based on the personal four-year journey of the researcher in an attempt to develop an off-grid, sustainable self-sufficient livelihood and habitation on a 1 000-square metre piece of rural land in the heritage mission village of Suurbraak, Western Cape, South Africa. This single case study attempts to embody a comprehensive antithesis to the current rural settlement approach implemented in South Africa. The approach is philosophical, applying Hegel's "determinate negation" conception of reality, as dialectic between a conception of "thesis" as global, scientific and regulated resulting in large-scale agriculture, poisoning of nature and inappropriate low-cost housing and its "antithesis" as grounded, philosophical, healthy subsistence habitation on the actual land.

This study, shaped by a literature review, proposes a concept coined 'niche settlement', comprising four focus areas as regards sustainable self-sufficiency: an owner-built dwelling from local materials, farm produce for consumption and self-medication, rain and energy harvesting, and taking responsibility for waste. In order to validate the case study contextually, an action research methodological approach was adopted. This began with a field study to interview marginal small-scale farmers, enriched by a land-use survey in the Suurbraak agri-village, in order to clarify the determinants for successful subsistence. These were land availability, proximity of land to homestead, appropriate scale, access to water, enabling legislation, and access to inputs and labour. The critical nature of these determinants is then shown as regards the niche settlement case study. The interplay of Swellendam Municipality regulations reveals contradictions that entail that the above determinants are not facilitated. This threatens a vulnerable two-century old agrarian heritage. The ensuing dialectic between the researcher and municipal officials who - when confronted by the contradictions - undertook to revise certain zoning decisions that threatened the viability of niche settlement approaches. The determinants may prove fertile ground for further research as criteria to shape rural settlement policy with respect to land

use, particularly given the need to factor in the looming global recession, the food crisis and peak oil.

OPSOMMING

Hierdie studie is op die vier jaar lange persoonlike reis van die navorser self baseer. Dit behels 'n poging om 'n kwart akker stuk grond in die landelike erfenis sending-dorp van Suurbraak, in die Wes-Kaap Provinsie in Suid-Afrika te bewoon en daarop ‘n off-grid, volhoubare en selfversorgende bestaan te ontwikkel.

Hierdie enkele gevallestudie poog om 'n omvattende antitese te beliggaam tot die benadering tot landelike nedersetting soos tans in Suid-Afrika geïmplementeer. Die benadering is filosofies, en pas toe Hegel se "beslissende weiering" konsepsie van die werklikheid, as dialektiek tussen 'n opvatting van die "tesis" as: globaal, wetenskaplik en gereguleerd wat grootskaalse landbou, die vergiftiging van die natuur en lae-koste behuising tot gevolg het en sy "antitese": gegrond, filosofies en gesonde bestaansboerdery op die grond. Die dialektiek kontrasteer die tesis op 'n makro-en kollektiewe vlak en die antitese op 'n mikro-en persoonlike vlak, wat aanleiding gee tot 'n "sintese", waaruit nuwe antwoorde ontstaan in die beslissende ingebed, eerder as in algemene teoretiese abstraksies. Kritiese oplossings lê vlak versteek in die mikrokosmos detail of in die konteks. Dit wil sê, is gedetermineerd vermom en vereis 'n metodiese en gefundeerde benadering wat nóg weke nóg maande, maar jare eerder van geduldige navorsing verg om te bemag.

Die Hegeliaanse metode soos gebruik beklemtoon dat dit onwaarskynlik is dat "begrippe" met hul kontekstuele "standaard begrippe" sal ooreenstem, maar in die proses van aanpassing word eindelose antwoorde uit die fynere detail van bepaalbare werklikheid opgetel. Hierdie antwoorde, wanner van toepassing, het die potensiaal om antitetiese manifestasies van die werklikheid in werklikheid te verifieer; die mikro is in staat om die makro te verklaar deur middel van 'n proses van die verwesenlikte waarheid.

Hierdie studie, deur 'n literatuuroorsig toegelig, stel 'n konsep geskep as "nis nedersetting” voor. Dit bestaan uit vier fokusareas wat betref volhoubare self-genoegsaamheid: 'n eienaar-geboude woning van plaaslike materiale, eie plaasprodukte vir verbruik en selfmedikasie, die

oes van reën en energie, en die neem van verantwoordelikheid vir afval. Ten einde die gevallestudie kontekstueel te waarmerk, is 'n aksie-navorsing metodologiese benadering ingeneem. Dit het begin met 'n gedokumenteerde veldstudie waarin onderhoude met marginale kleinskaal boere gevoer is en is verryk deur 'n grondgebruik-opname in die Suurbraak agri-dorp, ten einde die determinante vir 'n suksesvolle bestaansboerdery uit te lig. Dit het gelei tot 'n dieper begrip van wat die sukses van soortgelyke nis projekte bepaal: die beskikbaarheid van ’n (grond-)perseel, bewerkbare grond naby die woning geleë, toepaslike skaal, toegang tot water, bemagtigende wetgewing en toegang tot insette en arbeid. Die kritiese aard van hierdie determinante word met betrekking tot die gevallestudie getoon. Die wisselwerking van die Munisipaliteit Swellendam se regulasies openbaar teenstrydighede wat behels dat die bogenoemde determinante nie gefasiliteer is nie). Dit is teleurstellend deurdat dit 'n kwesbare twee-eeue oue agrariese erfenis bedreig. Die daaropvolgende dialektiek tussen die navorser en munisipale amptenare wat - gekonfronteer met die teenstrydighede geopenbaar in wetgewing en regulasies met betrekking tot die erfenis, grondgebruik en sonering - onderneem het om sekere besluite wat die lewensvatbaarheid van die nis nedersetting benaderings bedreig het om te keer, manifesteer sodoende as 'n sintese. 'n Verdere voorbeeld van sintese is die voorstel dat die belangrikste determinante effektief toegepas kan word as kriteria om vorm te gee aan die landelike nedersettingsbeleid met betrekking tot grondgebruik, veral gegewe die behoefte om die dreigende wêreldwye resessie, die voedsel-krisis en piek olie saam daarby onder sig te neem.

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I would like to credit my partner Sasha Lagrange (with French peasantry at heart), my father, Hendrik Mentz the academic, and my late grandfather, Hennie Mentz the Karoo herbalist, for their unique contributions, which were instrumental to this anti-thesis.

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ACRONYMS & ABBREVIATIONS

Co-ops:	Co-operatives (Local agricultural wholesalers)
GM:	Genetically modified
GMO:	Genetically-modified organisms
IDP:	Integrated Development Plan
IZS:	Integrated Zoning scheme
MHEL:	Minimum Household Existence Level
NTFP:	Non-timber forest products
R:	South African Rand
RDP:	Reconstruction and Development Programme
SABS:	South African Bureau of Standards
SDF:	Spatial Development Framework
UNEP:	United Nations Environment Programme
USA:	United States of America
USDA:	United States Department of Agriculture

FOREWORD

Because my problem statement, research objectives and questions are strongly influenced by my literature review, I have taken the liberty of adapting the traditional way of presenting research dissertations to align it with my methodological approach.

I have consequently consolidated my introduction and the literature review into one single chapter. My introduction therefore provides a glimpse into what the research is about, which is then informed by and expanded on through the literature review. Flowing from this, the introductory sections resume.

CHAPTER 1: Introduction and literature review

1.1 Introduction

1.1.1 Outline of chapter 1

This chapter presents the background and motivation for this research, articulates the problem statement, defines the key terms and concepts, and reflects on the possible significance that this study might have for alternative approaches to rural settlement. Thereafter, I present the research design, which (as mentioned in the foreword) has been incorporated into this chapter as it was significantly shaped by my literature review. The research question, rationale for the study, research objectives and limitations therefore follow the literature review.

1.1.2 Background and motivation

I recall a discussion, overheard when I was a child sitting at the feet of my parents, listening and not contributing to the conversation. A friend of my parents had passionately argued that we humans were all like rats trapped in our circumstances. Although the person has subsequently died, the example he gave still haunts me: the cunning rat discovers how to get at the cheese in the cage but not the trick of undoing the puzzle in order to regain its freedom.

In recent years, I have increasingly felt that we - humankind - are in many ways similar to that rat, in that there is accumulating evidence that humankind seems unable to address the systematic poisoning of its food and environment (Allen 2004, Coats 1996, Fukuoka 2008, Mollison 1991). This study retraces a four-year journey I[1] embarked upon to explore possible ways in which I could delink from the global economic and food regime, in order to achieve a degree of freedom from a global system that I construe as increasingly poisoned.

[1] The thesis is mostly narrated in the first person, as my life experience became an academic resource; at times, the thesis refers to “we”, which indicates my partner and me, as co-creators of the case study.

I have developed a strong aversion to the use of pesticides from my childhood years living on a fruit farm, where I was exposed to them from an early age. This problem has in the past years increasingly focused my attention on and culminated in my questioning of the prevailing agricultural order in South Africa, which I generalise as characterised by the concentration of land assets in the hands of a few, monoculture practices, and an apparent thoughtless propensity to spray fields with poison and inject animals with antibiotics.

A possible solution that we saw for ourselves lay in creating a lifestyle that was self-sufficient and that would therefore allow us to regain a level of personal autonomy and freedom from a corporate food regime.

In order to test this hypothesis (whether it was possible to regain personal autonomy from the corporate food regime), I decided, in 2009, to forfeit my urban, cosmopolitan existence and put into action an antithetical plan for creating an autonomous self-sufficient livelihood on a 1 000-square metre plot[2] in the small village of Suurbraak, within the Swellendam municipal jurisdiction of South Africa. During this process, I designed, tested and implemented a number of holistic or integrated systems with the aim of becoming as self-sufficient as possible with respect to food, energy, water, waste management and habitat. However, while attempting to establish ourselves we learnt that our challenges went beyond simply trying to live sustainably on our 1 000-square metre smallholding, in that we were soon confronted by discouraging and obstructive municipal regulations that highlighted for me the importance of enabling local regulations and national legislation. This alerted me to a further level of complexity that needed to be taken into account in this study, namely, the assumptions underpinning high-density Reconstruction and Development Programme (RDP) -type low cost housing erected outside the perimeter of rural

[2] I have used 0.1 hectares and 1 000-square metres interchangeably throughout the document. Here follows a breakdown of comparison measurements: 1 hectare = 1/100 square kilometres = 10 000 square metres = 2.47 acres. 1 Acre is 0.404686 hectares and ¼ acre = 0.1011715 hectares or 1 011.715 square metres (approximately 1 000 m^2).

towns. One of these assumptions is that food production is the exclusive domain of large-scale farming operations serving centralised economic hubs. If so, then RDP-style low-cost settlement solutions, which are by their very nature high-density developments, fail to serve the interest of the majority of rural people who are poor, often unemployed and are therefore without access to agricultural land (Datadesk 1996). This renders RDP-type projects and the communities they are meant to serve unsustainable, particularly if the larger context - constituted by an economic recession and peak oil - is taken into account.

In the course of implementing our project and while absorbing the ideas of authors with whom I resonate, I rediscovered Hegelian Phenomenology (Dove 1970), which I realised was the most applicable medium to capture, understand and articulate what I was attempting to achieve. The phenomenological approach, “that concentrates on the study of consciousness and the objects of direct experience” (Atkinson 2011), therefore provided me with a tool to address the deep frustration I felt with academic environments that to my mind tend to overemphasise theory to the detriment of direct experience. Consequently, I believe that the approach I have adopted in this study is appropriate, particularly as it is based on personal experience gleaned over a four-year period while living off-grid and can therefore, to my mind, serve as a valuable and viable antithesis to current rural development models.

1.1.3 Problem statement

The global food regime’s reliance on chemical fertilisers and pesticides means that we can no longer trust that the food we eat is not poisoned. However, there does not seem to be any way out of the poison trap built by humankind except for a path created by individuals trying to extricate themselves from the trap by rediscovering how to live sustainably and how to produce their own food. This, as we discovered in practice, was easier said than done. Firstly, it was difficult because our urban, cosmopolitan lifestyle had not provided us with the appropriate skills for self-reliance.

Secondly, when we set about trying to implement our project, we were soon confronted by municipal regulations that prevented us from fulfilling our goal of living a sustainable, autonomous lifestyle. Even more worrying was the realisation that these regulations that stood in our way, and the assumptions that informed them, were, in practice, depriving poor rural communities of a means to livelihood.

My challenge was therefore to learn from the literature of like-minded practitioners who had themselves achieved self-sufficiency. Further challenges included finding local examples of small-scale farming operations that exemplified self-sufficiency and establish what the determinants of their success were, with a view to comparing the extent to which these corresponded with the literature and what we sensed were the key determinants (a concept defined below and discussed throughout the thesis) for the success of our own project.

Also of relevance to the study were questions around the replicability or otherwise of our project and if there were any implications for land-use policy in general.

Finally, I have intentionally located myself as researcher in the process. Consequently, I have purposefully eschewed a rational, linear approach to this research project in preference to becoming intimately part of the process. This necessitated finding a research methodology that could embrace and articulate my dispositional approach to this project.

1.1.4 Summary of research objectives and research question

The study has two primary research objectives. Firstly, the main objective was to analyse a single, small-scale, off-grid livelihood operation in Suurbraak in the Swellendam magisterial district of the Western Cape, South Africa, using a Hegelian lens that assumes a process of “determinate negation” (Dove 1970:623), in order to arrive at a list of key determinants for success applicable to this operation, and one that may be relevant to other contexts.

Secondly, the study hypothesises an ideal niche model for sustainable rural human settlement, which represents an antithesis to the current rural settlement regime, but this was not explored to its full extent, as explained later.

The above objectives can hopefully be achieved by asking the following research question: **Is off-grid self-sufficiency a sustainable alternative for rural livelihood? If so, what are the determinants of success for such an alternative?**

1.1.5 Defining key terms and concepts

My thesis explores and discusses several key terms and concepts, hereby defined:

- An 'off-grid rural settlement' is a concept I define as land allotments available for owner-constructed habitation and agrarian pursuits, without the provision of any municipal services, with the possible exception of irrigation water.
- Although 'self-sufficiency' is a concept extensively discussed in the thesis, it is important to indicate that 'self-sufficiency', as referred to in this study, is an aspiration, rather than an ultimate end goal, as, objectively speaking, it is well nigh impossible to attain. The limitations to self-sufficiency are recognised and discussed in this study. It is important that the reader apprehends this concept with an open mind, which is why I echo the words of Seymour, who, in his seminal book *Self-Sufficiency* (2003), warns that:

> Self-sufficiency does not mean 'going back' to the acceptance of a lower standard of living. On the contrary, it is the striving for a higher standard of living, for food that is organically grown and good, for the good life in pleasant surroundings… and for the satisfaction that comes from doing difficult and intricate jobs well and successfully (2003:16).

Although for me, self-sufficiency does somehow also mean 'going back' to ancient knowledge and to an earlier connection with nature, which we seem to have lost and which some of the concepts explained below capture.

- An ‘on-grid rural settlement’ is a concept which, in the small scale context of this thesis, refers to low-cost housing built on high-density land parcels supplied with municipal services.
- The “metabolic rift” definition is inspired by Panitch and Leys (2007), who describe it as a process whereby “the agronomic methods of agro-industrialization abandon agriculture system’s natural biological base, thus reducing the possibility of recycling nutrients in and through the soil and water” (2007:177). I use the concept of “metabolic rift” to discuss its consequence, namely, that humans are disconnected from nature, because of their dependence on cheap oil.
- A ‘metabolic unification’ is a concept inspired by that of “metabolic rift”, coined to define a process in which people decouple from oil dependency by re-coupling their livelihood strategies directly to nature, by living on small parcels of land dependant on nature’s biological base. This metabolic unification requires the recycling of nutrients in, by and/or through humans, livestock, soil and water.
- ‘Niche settlement’ is a coined term that links habitation to ‘metabolic unification’ rather than to on-grid services.
- Phenomenology deals with knowledge gained through direct experience (Atkinson 2011).
- The concept “determinate negation” is rooted in Hegelian Philosophy: “Through experience, consciousness negates the first object. The new object thus created is not constituted by or a consequence of reflection but is determined by or in the vacuum created when the first object is negated” (Dove 1970:623). This concept is further explained in my methodological section.

- A 'determinant' is a term used throughout and can be defined as "a factor, which decisively affects the nature or outcome of something" (Oxford Dictionary of English 2010).

1.1.6 Significance of the study

The potential impact of the research can be felt at three levels. At a micro-level (small-scale farming for self-sufficiency), the in-depth research and empirical testing of small-scale decentralised systems could prove relevant for replication in similar geographic and climatic contexts. Aspects particularly applicable would be research findings on food and medicine production, energy, solid and water waste management techniques and owner-building techniques using low-cost and natural materials.

Additionally, the determinants tested at the micro-level are in many cases applicable at a meso-level[3] (in the context of a community or village). This was borne out when I pointed out the anomalous literature relating to the planning and zoning intentions in the area to the municipal officials responsible for planning/zoning. They subsequently indicated that they would look into the matter. So in turn, the impact that the study had at a meso-level has influenced processes at the macro-level in that my discussions with Swellendam municipality officials are influencing zoning attitudes (zoning is presently being addressed at municipal level). A potential national impact relates to national government policy in devising strategies aimed at revisiting current rural settlement paradigms, presently embedded in current land reform policy (Department of Rural Development and Land Reform 2010, Human Settlement Review 2010). However, this would require further research and it is beyond the scope of this single case study, which is carried out simply to embody an antithesis to rural settlement in South Africa.

[3] Other issues at the meso-level, such as the problems and challenges of town planning for niche settlement at a village level, are beyond the scope of this study, but are areas for further research.

1.1.7 Introduction to research outline and methodology

This research project includes a literature review that, *inter alia*, shaped my research question. It also included a road trip through the Western and Southern Cape during which I interviewed a number of small-scale farmers in order to learn how they survive. This single case study line of investigation was contextualised locally with respect to small-scale farmers regionally proximate to our off-grid niche settlement, thus it is a primary case study supported by multiple cases (Mukhija 2010).

I then systematically analysed every aspect of our own operation, the primary case study, with respect to our original vision in order to identify which of our interventions had been pivotal for success, using Hegel's phenomenological approach of "determinate negation". This is described fully in the methodological section of the next chapter.

From the above it should be clear, therefore, that my conclusions and recommendations are derived primarily from direct experience.

1.1.8 Outline of the dissertation

An outline of this dissertation is provided below.

The foreword mentions that the literature review was incorporated into chapter 1 as it provided a context for understanding the research question, which is also introduced in chapter 1 and then further elaborated on in chapter 2. My reading, set out in the literature review in the second section of this chapter , led me to conclude that living sustainably off-grid would require that my partner and I set in motion antithetical processes to the taken-for-granted *status quo;* a situation that I show in my literature review to be poisoning the planet. In order to do so, we would need to: (i) owner-build our home using local materials; (ii) produce our own food and beverage and manage our personal primary health using medicinal plants that we ourselves grow; (iii) harvest our own energy and water; and (iv) manage our own waste.

We undertook a road trip in the Western and Southern Cape (reported in chapter 3) to ascertain why certain small-scale, off-grid farming operations succeeded. I broadened my enquiry (also reported in chapter 3) into the local agrarian context in Suurbraak. Although the road trip interviews and Suurbraak agri-village analysis affirmed that living off-grid was feasible, they didn't go far enough in that they didn't detail the 'why' and 'how' answers that I believed would emerge from a microcosmic analysis of our own rural, off-grid, self-sufficiency project in Suurbraak (chapter 4). This detailed analysis - using the process of "determinate negation" - was used to glean or unearth the key determinants that would necessarily facilitate the success of our operation, ensuring that we could live sustainably and, in so doing, personify, manifest or bring into focus the possibility of an antithetical response to the *status quo* (i.e. thesis) that is poisoning our planet.

Chapter 5 presents a synthesis flowing from the dialectical processes set in motion by our project. It illustrates how the process of unearthing the key determinants for self-sufficiency formed the basis of conversations I had with local municipal officials and how these interactions promised to affect local legislation related to heritage and land use.

1.2 Literature review

1.2.1 Overview

Our decision to trade our convenient, urban, cosmopolitan lives in order to attempt to live sustainably off-grid was shaped, *inter alia*, by many of the books introduced in 1.2.2. Some of the rationale behind our decision, reviewed in this section, included the commoditisation of nature by humans for profit and a poisoned food chain that has resulted in new and frightening maladies we do not fully understand, such as mad cow disease (Schlosser 2001).

However, our decision was not only based on an aspiration to live healthier lives. It had a spiritual dimension, also discussed in this section ('spiritual', in the broadest sense of the word as articulated in the writings, *inter alia*, of Bateson (2000), Fukuoka (2008) and Hegel (2003)) and an activist dimension - to the extent that we no longer wished to participate in processes that we saw as harmful to our planet.

However, once we actually moved onto our bare 1 000-square metre patch of earth, we very soon realised that theory isn't necessarily portable or practicable. We therefore had to find our own way rather than, for instance, following Mollison's permaculture principles (1991).

Section 1.2.3 introduces authors whose insights helped me marry theory with practice by seeing myself as free, not to follow someone else's model or implement someone else's ideas, but rather as capable of personally embodying an antithetical process (antithetical to the economic forces commoditising nature). A process that - through a lived, deepening and widening dialectic with nature - would unearth or bring into focus the key determinants that would ensure the success of our niche project. Some additional authors who provided the necessary breakthrough for me, and who are discussed in this section, include Constanza (2003) and Gadow (1992).

Our lived reality also hit legislative snags, which meant I also needed to study the applicable land use, heritage and zoning regulations discussed in 1.2.4. This proved very useful during my discussions with local officials responsible for these portfolios, in that I was able to point out serious anomalies that need to be taken into account by legislators, particularly with respect to heritage considerations and long-term rural sustainability for the poor.

1.2.2 Justifying self-sufficiency

Masanobu Fukuoka's observation that science needs to be approached scientifically, whereas nature must be approached philosophically (2008), helped me delineate two

distinguishable states, modes and/or processes, namely ‘scientific’ and ‘philosophical’. By ‘philosophical’, I mean knowing or understanding with humility, reflectively, questioningly and intimately as opposed to a ‘scientific’ mode of knowing that would require me to remove myself from that which I’m researching in order to become objective, rational and linear and, by so doing, reducing the complexity, for instance, of nature to facts, figures and data. In this section, I discuss the authors who point out what happens when humans approach nature scientifically. I also discuss authors who, like Fukuoka, demonstrate a philosophical approach to nature. Both sets of authors, those who write about how we are poisoning nature and those who help us understand how to escape the trap we have created, were instrumental in helping us to decide to decouple from our prior convenient, urban, cosmopolitan lifestyle in order to get closer to nature. The intention of this section is not to demonise conventional farming by addressing all of the well-documented negative side effects associated with this type of farming and so water, soil and climate issues are not addressed. Rather it is to establish two points: that corporate food is of doubtful origin (possible toxicity) and that this type of food is heavily reliant on cheap fossil fuel energy, which is problematic in a peak oil scenario.

The following definition of toxic substances is relevant to this issue:

> The International Joint Commission (IJC) has defined toxic substances to mean a substance which can cause death, disease, behavioural abnormalities, cancer, genetic mutation, physiological or reproductive malfunctions or physical deformities in any organism or its offspring, or which can become poisonous after concentrations in the food chain or in combination with other substances (Allen 2004:141).

In the past, all in the ‘village’ could trust the food that they ate because they were familiar with the source. In today’s global village we have ceded control of the food chain to multinationals (Pollan 2009, Schlosser 2001, Swilling & Annecke 2012) and thus now find ourselves in an analogous situation to the rat that discovered how to get into the cage but had no exit plan.

Natural living pioneers - Viktor Schauberger, a friend and influence on Rudolf Steiner who pioneered the biodynamic farming method; Bill Mollison, of permaculture design and Masanobu Fukuoka, who pioneered "nature" or " do-little" farming - all argue that civilisation is on a path of destruction (Coats 1996; Fukuoka 2008; Mollison 1991). In fact, as Fukuoka argues, our civilisation is not civilised. It is rampant materialism disconnected from nature, which can only result in our destruction (Fukuoka 2008).

It is therefore of little surprise that society mirrors this rift. This is embodied by a "metabolic rift" between society, representing materialism, and nature, representing spirit[4].

> The metabolic rift then refers to the process whereby the agronomic methods of agro-industrialization abandon agriculture's natural biological base, reducing the possibility of recycling nutrients in and through the soil and water. Thus, the progressive subordination of agriculture to capitalist production relations can also be seen as a metabolic rift between countryside and city (Panitch and Leys, 2007:177).[5]

Allen (2004) speaks eloquently and in different terms of this metabolic rift, using synthetic toxins as an example: "The Dioxin War exposes the dealings of powerful chemical corporations who have since the 1939 war been pumping toxic chemicals into our food chain via industry, agriculture and war" (Allen 2004:141). He goes on to argue that, "…perhaps half the jobs in the world are dependent on chlorine chemistry in some way or another" (Allen 2004:141). He describes the workings of mainstream civilisation driving the chemical industry:

> The shareholders are society itself. The entire system is funded by society. Every time someone takes out an insurance policy or deposits money in a bank, capitalism benefits. The movement of capital through the system, by financiers, stockbrokers and shareholders, is the stack of cards that hold the corporations up. To stay up the corporations must ensure that their own flow of capital is not impeded. A contaminated product, if prohibited, would bring that house of cards down. So when the chlorophenol producers were faced with bans on their most lucrative products they fought hard to keep them on the market (Allen 2004:139).

[4] Much emphasis in this review is aimed at developing a notion of spirit as an 'other' notion, in opposition to rational discursive consciousness.
[5] Petroleum plays a central role in widening this rift… a major input in agro-industrial farming also used in producing inorganic fertiliser, pesticides and herbicides (Jason 2011).

Global corporations are now larger and more powerful than many nations. It is therefore difficult to police global entities; externalities such as pollution are difficult to control (Jason 2011). Allen sums up the issue:

> Persistent toxic substances are too dangerous to the biosphere and humans to permit their release in any quantity, and all persistent toxic substances are dangerous to the environment, deleterious to the human condition, and can no longer be tolerated in the ecosystem, whether or not unassailable scientific proof of acute or chronic damage is universally accepted (JVC in Allen 2004:141).

Conventional farming practices use hosts of toxic substances that are sprayed onto soils and the food that people consume (Allen 2004, Bateson 2000, Coats 1996, Fukuoka 1993, Mollison 1991). By virtue of the toxic substances in the food chain, people's link to the food they consume, and therefore to nature, is insidious. Allen highlights the imported notion of 'biomagnification': "Conventional agriculture employs toxic substances, herbicides, pesticides which are now most certainly linked to health problems, infertility and death. These enter the food chain where they biomagnify" (2004: 138). A recent report by UNEP (2012), titled *Global Chemicals Outlook: Towards Sound Management of Chemicals*, explicitly links "bioaccumulation of chemicals" in animals, especially those high in the food chain, to cancer (UNEP 2012:19). This leaves leeway for speculation about the effects of this bioaccumulation on the species at the very pinnacle of the food chain – humans.

For many analysts, corporate-controlled genetically-modified (GM) plants are also an issue. The introduction of GM organisms (GMO) by these corporations goes against the public's best interests: "It has become abundantly clear that we can no longer trust our food, corporate fraud such as the Monsanto studies" (*Annals of the EPA: part 4: the Monsanto Investigation* [Annapolis, Md: Environmental Research Foundation, 1996] cited in Allen 2004:145). Adding substance to this claim is a recently-released report on a two-year study on the long-term effects of GM maize

and pesticide (Séralini et al. 2012). This study scientifically documents the tumorous growths and other health disorders manifesting in rats and stemming from the ingestion of GM maize combined with minute doses of its pesticide. According to Séralini et al. (2012), these findings contradicted a nine-month Monsanto toxicity study that did not report these severe health threats. The study caused great controversy as revelations such as these directly undermine the economic interest of GMO manufacturers.

These two cases illustrate that the globally influential corporation functions beyond the limitations imposed by law, morality, public health and environment, by, as in the cited examples, influencing dioxin toxicity standards that ultimately impinge on the environment (Allen 2004) and by defending clearly harmful products under the auspices of science implied and exposed by Séralini et al. research (2012).

There is growing evidence that we are living in a world increasingly saturated with manmade chemical compounds.

> Mainstream civilization is reaping what it sows, Annold Schecter has said, 'Almost all polychlorinated dibenzo-para-dioxins and polychlorinated dibenzofurans found in humans from the general population are believed to come from food, especially meat, milk, fish, and their by-products. (Allen 2004:133)

Our environment is therefore increasingly toxic. Allen refers to World Health Organisation studies that point out how "80% of all cancer is caused by the environment" (WHO in Allen 2004:136). A recently-released UNEP report introduces the concept of "chemical intensification" due to the emergence of several global trends. These include: i) the fact that chemical products are systematically and increasingly replacing natural products in industrial and commercial products; ii) the development and release of new chemical compounds that modern lifestyles call for; iii) the increased complexity of the chemical composition themselves; and iv) the "more intricate chemical supply chain" (UNEP 2012:13). The report highlights how

the agriculture sector in developing countries accounts for most chemical release. Disturbing facts are shared about South Africa: “Total pesticide expenditures in South Africa rose 59% over the period 1999 to 2009, and are projected to rise another 55% in the period 2009 to 2019” (UNEP 2012:17).

The above points illustrate the detrimental effect of the production of toxins on humanity. Eric Schlosser’s critique of the fast food business in the United States of America (USA) highlights other issues relating to centralised food economies (2001). Schlosser points out that processed ‘food assemblies’ have grave ethical and health implications. Feedlots can contain as many as a hundred thousand cattle fed on grain, growth steroids and protein and kept alive with antibiotics. The assembly process that produces a single burger patty can contain meat from hundreds of cows (Schlosser 2001).

> A USDA (United States Department of Agriculture) study claims, usually 1% feedlot cattle carry E. coli 0157:H7. This is a deadly strain, E. coli0157:H7 is resistant to acid, salt, and chlorine. It can live in fresh water or seawater. It can live on kitchen countertops for days and moist environments for weeks. It can withstand freezing. It can survive heat up to 160 degrees Fahrenheit. (Schlosser 2001:201)

Protein feeds have led to outbreaks of mad cow disease (a prion disease).

> Prions cause transmissible and genetic neurodegenerative diseases, including scrapie and bovine spongiform encephalopathy of animals and Creutzfeldt-Jakob and Gerstmann-Straussler-Scheinker diseases of humans. Infectious prion particles are composed largely, if not entirely, of an abnormal isoform of the prion protein, which is encoded by a chromosomal gene. A posttranslational process, as yet unidentified, converts the cellular prion protein into an abnormal isoform. Scrapie incubation times, neuropathology, and prion synthesis in transgenic mice are controlled by the prion protein gene. Point mutations in the prion protein genes of animals and humans are genetically linked to development of neuro-degeneration. Transgenic mice expressing mutant prion proteins spontaneously develop neurologic dysfunction and spongiform neuropathology. Understanding prion diseases may advance investigations of other neurodegenerative disorders and of the processes by which neurons differentiate, function for decades, and then grow senescent. (Prusiner 1991:1)

Thus, prion disease can cross to humans who consume contaminated meat. The human victim then contracts Creutzfeldt-Jakob disease, which destroys his or her brain leading to a terrible death (Schlosser 2001). This disease-causing agent - which resembles a protein but behaves like a virus - still perplexes scientists. At present, it is claimed that the incubation period is ten years; some research says it may be as many as 30 years, which means thousands of people may still die from the disease (Schlosser 2001).

> A very small percentage of animals are tested for these diseases before being slaughtered, centralized meat processing plants in America can produce 800 000 pounds of hamburgers in a day, a single infected cow can contaminate 32 000 pounds of these patties, this meat is rapidly dispersed to diverse markets (Schlosser 2001).

Processing slaughtered meat on fast-moving production lines disperses intestinal faeces quickly through the food processing plants. Pasteurisation and sometimes irradiation is employed to protect the food (Schlosser 2001). However, M.D. Henry Bieler demonstrates in his book, *Food is your best medicine*, that pasteurisation destroys the nutrient value of the food (Bieler 1966). If people only eat processed food, they are, in effect, disconnecting from nature. If so, how will they ever know the difference between what feeds them and what fills them (Fukuoka 2008)? Unfortunately, all these industrial techniques are key business strategies essential to the viability of large-scale industrial production because of vertical integration and transportation (Schlosser 2001). In contrast, Fukuoka points out that nature has its own production line, which is perfect and produces no waste (Fukuoka 1993).

Perhaps we should revisit the Physiocrats' ideology that stresses our link with nature:

> … divine providence has ordained the existence of a universal and inherently perfect natural order. Conformity to the laws of the natural order will ensure maximum happiness. Whereas infringement of the fixed laws of nature will call forth correspondingly disastrous consequences. Laws that go against nature will fail, in the long run the law of nature is supreme (Rima 1996:69).

Can one still dispute Fukuoka's argument that civilisation is not civilised (2008)? As he points out, "There are stories that, deceived by a fox, people have eaten horse manure. It is nothing to laugh about … People taste only with the tip of the tongue, so they are easily fooled" (Fukuoka 2008:137).

The above discussion makes a clear argument for the dangers inherent in a system where much of our 'corporate food' is of doubtful origin. Therefore, we can no longer trust the global, centralised food technology system described above and coined as the 'third food regimes (Swilling & Annecke 2012) that currently modulates our consumerist behaviour. A counter argument is that the antidote or antithesis of corporate processed food is organic, the basic thesis being that we can avoid the harm by eating organic. In many respects, this is true. A research paper titled, *Fruit and Soil Quality of Organic and Conventional Strawberry Agroecosystems*, illustrates this:

> Our findings show that the organic strawberry farms produced higher quality fruit and that their higher quality soils may have greater microbial functional capability and resilience to stress. These findings justify additional investigations aimed at detecting and quantifying such effects and their interactions. (Reganold et al. 2010)

The problem with this counter argument is that the organic movement is also gradually being monopolised and adapted by large-scale corporate interests.

Michael Pollan in his publication, *The omnivore's dilemma,* coins the phrase "industrial organic" (2009). Pollan cites the corporations who lie behind the big organic brands and documents how large-scale monoculture and factory farming principles are utilised in organic production. Pollan states that according to the USDA a product labelled "organic" must contain 95% organic ingredients. The remaining 5% can be the preservatives and synthetic additives that make organic processed food possible (Pollan 2009). So buying organic is not antithetical to centralised corporate food production. Perhaps the only way to dispel any doubts around the

food we eat and, therefore, our personal health, is to grow it oneself and, by so doing, create a dialectical process between a local antithesis with respect to the global regime (thesis). Hence Fukuoka's argument, that we need to decouple ourselves from the centralised system and, as far as possible, produce food locally that can then be trusted as non-toxic (2008).

Why does society continue blindly on the same course of self-destruction? Why does a human being (or a rat for that matter), offered a platter of potentially GM maize meal, served with prion-infected beef and a side portion of stir-fried pesticide-treated vegetables in E. coli residue gravy, accept the meal? Mostly it is because we do not have a choice. Even those of us who know that our food might be contaminated, have no way of escaping the trap that we have voluntarily entered. We therefore take a (un)calculated risk, hoping that our food is non-toxic. To escape our predicament, we must perhaps carefully retrace our steps.

In the third century, the metaphysics of the Neo-Platonists identified three levels to perception: Divine, Mind and Material. The goal of consciousness was to progress towards Divine (Sheppard 1982). Hegel published his *Phenomenology of Mind* (2000) in the 19th century. Hegel formulated different states of co-existing "self". There is "self" as a collective self, which acts as a mediating consciousness. This self opposes and shrouds a true "unconditioned self" that goes unseen. However, it is this latter self that is the goal on the path to "absolute knowledge" (Hegel 2003). In the 20th century, Gregory Bateson in his publication, *The Ecology of Mind*, wrote that it is false to see "mind" as an internal process. Bateson used the analogy of a woodchopper chopping down a tree. The tree, the axe and the woodchopper all feed back into each other. This feedback affects the whole system, and therefore the whole system (nature, tree, axe and woodchopper) displays characteristics of mind (Bateson 2000). Bateson claimed therefore that whatever we normally take to be "mind" (in other words something inside ourselves) is an illusion, in that it is a

separation or abstraction from truth or reality (Bateson 2000). Our conventional idea is not the-thing-in-itself. Hegel connotes the movement of this divide with the term "determinate". The English Oxford Dictionary defines determinate as: "having exact and discernible limits or form … (It originates from) late Middle English: from Latin *determinatus* "limited", determined, past participle of *determinare*" (2010:478).

The three viewpoints (Neo-Platonic, Hegelian and Bateson) have a common thread linking consciousness or mind to processes beyond the "self" of the individual.

Hegel states that human consciousness has been fundamentally rerouted from a position of "being" to a position of "being-for-self" (Hegel in Stewart 1995) manifesting as "rational discursive consciousness" (Shaw 1985). This rational discursive consciousness (that can be correlated to the ego process) eclipses the true underlying self. It is a mode of self that has become decoupled from spirit as it can only produce itself in a materialist society (Hegel 2003). The best argument in favour of this mode, "mediating discursive self-consciousness", is that rational thought is probably the most effective way of forecasting favourable events for this self, the mediating self. However, this rational mode of consciousness excludes spirit and therefore cannot be considered an inclusive "holistic metaphysics" embodied by what the Neo-Platonists called the three levels of consciousness (Shaw 1985). The problem, however, is that this mediating self can manifest only in materialism, which then becomes its own justification. Hegel writes "…Rational self-consciousness must produce itself by its own activity" (Hegel in Stewart 1995:762). Is this not the driving force behind our society and the growth paradigm of our corporate world? Could this limited understanding of self not be the essence of the problem? For instance - in my own case - whenever I have come up against a problem on our own small piece of ground, I attempt to curb this rational self-consciousness and let the land speak (via dialectic with the land).

In other words, in attempting not to impose my ideas onto the land, I embody or acknowledge that my concept of self is limited and limiting to the extent that it fails to recognise an “other” (in this instance the land/nature that I allow to speak). This inability to see ourselves as part of a whole and therefore part of the problem is because rational discursive self’s way of knowing manifests as “degrees of abstraction”, thus perpetuating more abstraction to the exclusion of “other”, also denoted as “Spirit” (Hegel 1995) or “Mind” (Bateson 2000) and “Divine” (Neo-Platonists) (Shaw 1985). This is the mental rat trap in which we find ourselves.

We can use Bateson’s concept of a human mind cut off from the larger interconnected wholeness out of which mind is constituted, to understand the problems besetting our materialist society, which prioritises profits over health. For example, our centralised corporate economy finds it necessary to feed protein feeds to herbivorous livestock to boost growth and therefore profits. This is analogous to the woodchopper who does not understand that he is part of a living whole (“mind” using Bateson’s terminology) and therefore disconnected from the feedback of the whole, into the system that then results in a prion disease (the tree being repeatedly struck by the axe). The disease then crosses the species divide (this can be represented by the tree beginning to topple) and attacks humans as a protein displaying virus-like qualities (this can be represented by the tree falling on the woodchopper’s head), thus literally destroying the brain of the victim (which the woodchopper initially interpreted as something inside himself: his own little personal mind). Seen from the perspective of the whole, it is not difficult pinpointing where the pathology lies. Hence, the irony of the colloquial expression used to denote prion disease as “mad cow disease”. Is this (the cow) the true location for the madness that inhabits this system? Could the pathology not equally be collective human consciousness blindly perpetuating a harmful system?

If there is any truth in this collective blind perpetuation of harm, then there is little hope of discovering what holds us in bondage to the system, namely our rational discursive consciousness, which got us into this trap in the first instance, thus limiting us to perpetuation of this partial concept of self. However, if our behaviour won't change, it is not to say that our environment can't force change upon us.

There has been much debate around whether our planet is reaching 'peak oil' (Almeida & Silva 2011; Jason 2011), i.e., where we have extracted more than half of the oil-based resources of the planet. The present century has been described as an age of peak oil or worse still, as many sources cite, an age of 'peak-everything'. If so, then what are the implications for our materialist society? What changes can be expected?

In their journal article, *Timing and future consequences of the peak of oil production*, Almeida and Silva (2011) state that, according to the most credible predictions, peak oil occurred in 2011. The post-2008 spikes in oil prices are therefore, in all likelihood, indicative of supply constraints (Almeida & Silva 2011). According to Jason (2011), petroleum is the root cause of the "the metabolic rift". As stated above, petroleum lies at the very core of our materialist value system.

The metabolic rift can only be sustained with cheap oil. However, if the oil price increases - as it did before the 2008 financial crisis - "the whole global industrial machine faces the prospect of collapse" (Allen 2004:141). In this regard, it needs to be pointed out that fossil fuel makes up 81.4% of global commercial energy (OECD/IEA in Almeida & Silva 2011). McMichael points out that agriculture is now heavily dependent on fossil fuel (2009).

The time to make principled and philosophical choices is quickly being eclipsed, as we are moving fast towards an age of necessity. The authors conclude that as available oil resources dwindle, transportation as we know it will be fundamentally altered. Both peak oil and peak everything is a concern to our materialist system.

The same supply constraints facing a non-renewable resource like oil, apply also to all other resources (Swilling & Annecke 2012). Forces in our centralised global economy are in outright competition to monopolise - through commoditisation - all available and previously cheap and abundant resources; this is a determinate proviso for the systems viability and success (Jason 2011).

Constanza points out that scarcity brings about redundancies resulting in systems that can no longer be maintained (2003). The system as a whole must therefore change or collapse. This change he termed “adjustment” (Constanza 2003:233). Let us consider the adjustments that will be required in agriculture in a context of ‘peak everything’: can we envisage a scenario in which large-scale petro-chemical-based conventional farming systems servicing centralised global markets could fail or adjust? Might this failure then result in small-scale labour-based farms servicing decentralised local markets? Cuba’s “special period” shows that this could be a distinct possibility. In the 1990s, Cuba suffered a severe financial crisis associated with a blockade on vital imports to the country; particularly relevant was the termination of their oil supply. Cubans of all classes adjusted by transforming spare ground into agroecological farming units in an attempt to sustain themselves. A paper entitled *The Greening of the “barrios”: Urban Agriculture for Food Security in Cuba* illustrates this (Altieri et al. 1999). What is more this adjustment to small-scale agroecological food security positively affected Cubans health:

> During the crisis period, the proportion of physically active adults increased from 30% to 67%, and a 1.5-unit shift in the body mass index distribution was observed, along with a change in the distribution of body mass index categories. The prevalence of obesity declined from 14% to 7%, the prevalence of overweight increased 1%, and the prevalence of normal weight increased 4%. During 1997–2002, there were declines in deaths attributed to diabetes (51%), coronary heart disease (35%), stroke (20%), and all causes (18%). An outbreak of neuropathy and a modest increase in the all-cause death rate among the elderly were also observed. (Franco et al. 2007)

If Constanza is correct, then envisaging this may be a route to it manifesting.

It is likely in a peak oil scenario that the poor and landless will struggle the most. However, the few with access to small pieces of arable land may be able to produce food relatively unhindered by the economics that dictate the metabolic rift. Land and water assets produce a double benefit. On the one hand, what the poor can produce at home offsets their total food bill and diversifies livelihood risk. On the other hand, any surpluses poor households produce for sale on markets could be sold at existing market prices even in conditions of hyperinflation. This surely provides an automatic insurance for uncertain economic times against recession, food scarcity and unemployment. The 2008 hyperinflation on food items just shows how vulnerable the poor are to food price fluctuations. In her book, *The Hungry season: feeding Southern Africa's cities,* Leonie Joubert (2012) references a National Agricultural Marketing Council Food Price Monitor study that tracked income expenditure of households following the 2008 so-called ' food crises'. The study reports that the portion of the budget the lowest decile (the poorest 10% of the population) spent on their food bills in 2008 amounted to 29% of their income (Joubert 2012). According to the study, this same decile spent 36% of the household budget on food at the end of 2011. Affluent South Africans (top 30% wealthiest) in comparison increased their food expenditure from 2.3% of their budget to 2.9% over the same period. The more the poor spend on food, the less they can spend on other essential household items. Food expenditure traditionally tops the list of poor household's expenditure, followed by housing and transportation (Statistics of South Africa cited in Joubert 2012). Producing food at home therefore could be an important tool for lowering the percentage of the total budget spent on food by the rural poor in times of economic crises; this also entails an improvement in food sovereignty:

> Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and it includes their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It ensures that the rights to use and manage lands, territories, waters, seeds, livestock and biodiversity are in the hands of those of us who produce food.

> (Declaration of the Forum for Food Sovereignty, Nyeleni 2007 in Auerbach 2011:19)

The global centralised economic system - controlled by multinational corporations and embodied in the myth of the American dream - depicts an extreme (Hegelian) 'thesis' or version of civilisation situated at a global or macrocosmic level of abstraction that I have argued is toxic and in the hands of multinational corporate interests[6]. As a counterpoise, this study posits an antithetical position at the micro-level, as embodied in the concept of "localisation" pioneered by Helena Norbert-Hodge (2008), which in this case will be a village, Suurbraak, where an actual, practically-implemented project (niche) will be the focus[7].

I, the practitioner, am akin to the rat, unable to influence the whole (the cage in which I find myself). Perhaps to 'escape', I must carefully assess my localised environment; the very soil I till (grand theoretical schemes to change the world being too abstract) provides me with humility, health and personal freedom. Hegel himself refers to something akin to this process, stating that society finds its true path by manifesting in positive activity that, in turn, manifests as "Spirit"[8] in the universal (Hegel 2003).

> Rather this spirit is a free nation, in which custom and order constitute the common substance of all, whose reality and existence each and every one knows to be his own will and his own deed (Hegel 2003:412).

Society, having reached this ultimate stage of realising the universal objective of Spirit in the form of a centralised, oligarchic globalism invokes its opposite (antithesis), which is the '"individual subjective" (Hegel 2003). The Spirit, thus

[6] I place the problem at the global level, as my impression is that we all participate in reinforcing this civilisation to the degree to which we participate in it.
[7] Comparisons across abstractions can be criticised. The purpose here is to highlight that in our everyday activities and consumption patterns, we are supporting the global system to varying degrees. If we problematise the system but continue to participate in it, then our actions are contradictory to our intentions.
[8] All future occurrences of the term "Spirit" with a capitalised spelling will refer to the Hegelian notion of Spirit.

abandoned at the universal macrocosmic objective level, can only find refuge in the individual (that is to say the local level) (Hegel 2003).

When I stepped out of society to see whether I could live off-grid, a void was created where formally the norms of society prevailed. This allowed for the manifestation of 'other', antithetical, 'new' realms, which can also be referred to as the Spirit, as per Hegel and, therefore, a different conception of how to live my life.

> Since then its trust is broken, and the substance of the nation cracked, spirit, which was the connecting medium of unstable extremes, has now come forward as an extreme… This negative activity has turned the element of pathos into its own material, and given itself its content; and this unity comes out as a work, universal spirit individualized and consciously presented (Hegel 2003:414).

This individualised antithesis should however not be confused with a proposed solution to the global problems outlined. If Hegel is correct, then the global system currently manifesting is merely symptomatic of an ethical order in ruins (Hegel 2003).

1.2.3 Theoretical framework: the off-grid homestead

In this section, I describe how the authors mentioned have helped me understand that I wouldn't achieve what I set out to if I simply located and then replicated a model deemed appropriate. Instead, I needed to appreciate the dynamic nature of reality, of which we are part and that success might only manifest in the project with time.

Mollison (1991), in his book, *Introduction to Permaculture*, brought home to me the importance of action:

> I began to protest against the political and industrial systems I saw were killing us and the world around us. But I soon decided that it was no good persisting with opposition that in the end achieved nothing. I withdrew from society for two years: I did not want to oppose anything ever again and waste my time. I wanted to come back only with something very positive, something that would allow us all to exist without the wholesale collapse of biological systems (Mollison: 1991:v).

There is however a high risk that principles of sustainable smallholder farming - such as those proposed by Mollison (1991) - are replicated by an end user at a level of abstraction remote from their source reality. I mean “abstraction” - as understood in Bateson (2000) - to be the generalising of reality, the smudging over of complexity, and the delineation of categories. If Bateson is correct, then the value of any model lies less in its replicability (finite accuracy) than in its usefulness in elucidating a principled vision. Thus, the principles articulated in the model inform practices on the ground and practices on the ground inform the principled vision. Principles then guide me when I’m working on the ground and what I’m doing on the ground guides the theory as embodied in the principles.

To this end, Constanza proposes a methodological approach called “Pragmatic modelling,” which consists of a three-step process: “Firstly envisioning how things are and how they should be, secondly analysis towards the vision, thirdly appropriate implementation” (2003:655).

Both Constanza and Bateson emphasise the “principled vision” (Bateson 2000, Constanza 2003). My aim was therefore to articulate a principled vision to live by, however I ran into difficulties when I discovered that many of the principles envisioned did not actually work effectively in practice.

I ascribed the aforementioned difficulties to “bio-complexity”. Bio-complexity was more than likely behind the fact that most of the original theory implemented on the land was negated in practice by hidden circumstances I had not anticipated. However, it turned out that this fact was the key to solving my methodological problem. A paper entitled *Existential Ecology: The human/Natural World* by Sally Gadow (1992) highlights this.

In this paper, Gadow points out that Hegel’s dialectic is both practical and theoretical in that it emphasises direct experience of nature (Gadow 1992), via the Hegelian concept of an “act” (Hegel in Stewart 1995). Gadow writes, “The model must

incorporate humans as subjective beings, essentially perspectival and thus – like all sentient beings – organisers of the relational field in which they exist" (1992:601). Gadow thus links people to homes, to ecology, suggesting humans must fit into niches as integral subjective participants of ecosystems. "A dialectical approach in ecology… must culminate in its original concern: how to locate human existence, reconcile nature and home" (Gadow 1992:602).

Gadow provided the conceptual framework needed to describe my experience on the ground. As such, these concepts helped me understand that my continual dialectical adaptation in nature was the key to effective progress. Further enriching this analytical lens is the definition given of "specimen": "A specimen is, in effect, a summation of its species historical adaptive relationship to the environment" (Callicot in Gadow 1992:599). The land has changed me - as a specimen – as much as I changed the land, implying that my starting thesis needed to be negated by fundamentally new theses through an ever more proximate evolutionary process. Through this process sometimes a negation of a negation may end in an affirmation of the original thesis but it is in the process that true knowledge is owned. The process is essential to locating the hidden make-or-break aspects or nodal points. This increasingly inclusive process can also be interpreted through the aforementioned Neo-Platonic lens, with each step corresponding to a different level of consciousness: level 3 representing the material world, level 2 representing the mind, level 1 representing the divine (spiritual) (Dove 1970, Stewart 1995). As one matures through the process or dialectic, one realises the new goals are not the same as the ones that were originally rationalised; there is transformation of spirit (truth) and one realises that new truths are made through processes.

These philosophical points are practically illustrated by Masanobu Fukuoka, in his book *The One-Straw Revolution* (2008). All the farming techniques mentioned in his work result from many years of pragmatic modelling, but they also parallel a deeper

spiritual process that transcends a purely pragmatic approach. Fukuoka advocates the adoption of the "non-discriminating mind" (2008), building on layer upon layer of experience, year after year. Fukuoka's model sees each challenge as a lived situation; one in which he is not an outsider looking in but an active participant. The techniques he later employed were different from the agriculture practices he used at the beginning of his farming practice. His method was anchored in 'the now' and his model was developed from years of interpreting a highly-evolved and complex ecology. He played an integral role in this ecology as opposed to intervening as an anthropocentric caretaker. For a layperson to read his books and pragmatically implement his model on a random piece of earth would probably spell failure. These techniques, although practical, are site-specific and it is therefore up to each individual to work out his or her own contextual recipe (Fukuoka 2008). The emphasis should therefore be placed on Fukuoka's principled vision that lends credibility to the claim of sustainable agriculture. It is not because he has created a successful farming model, but rather because he lived out his model aligned with his vision for sustainable agriculture that his model retains credibility. It is via this vision, these principles, that one can conceive alternatives for oneself[9]. These include the concepts of "do nothing agriculture" (Fukuoka 2008:15) or eating simply from one's garden according to the seasons. These are examples of subtle principles far removed from mainstream civilisation with its dependence on conventional agriculture. These principles are therefore very difficult for a mindset steeped in rational discursive materialism to appreciate fully. There is a danger that they are understood as academic abstractions and not actually as desirable necessities for spiritual and physical health, as well as successful farming practices. In this regard, it should not be forgotten that Fukuoka started out as an agrarian plant pathologist and, as such, he was a conduit of conventional agriculture before his own revolution

[9] Fukuoka himself would no doubt criticise this comment because he preaches the "non-discriminating mind", so that "do little farming" means do nothing, don't discriminate, leave analytical thought out of it, which, as will be seen later, is echoed by Hegel, who says one must hold off interpretations as much as possible.

towards “nature farming” commenced (Fukuoka 2008:33). Fukuoka made the necessary changes in his own life to align his actual reality with theoretical sustainability principles. He understood that revolution must start somewhere and he decoupled himself from mainstream civilisation and coupled himself to nature (Fukuoka 2008). In this process, new emergent opportunities opened up for him, but most importantly, lessons were learnt on the ground. He had to suffer economic losses before he saw productive results; his process initially was revolutionary in making the big shift but then, joining nature, it became evolutionary (Fukuoka 2008).

If Gadow directed me toward finding a language of expression, Fukuoka became my example to follow. This evolutionary approach is embodied by the following quote by Constanza - an extract on evolutionary economics - that deals with alternate ways of producing, storing and allocating resources:

> The evolutionary paradigm is different from the conventional optimization paradigm popular in economics in at least four important respects: 1. Evolution is path dependent, meaning that the detailed history and dynamics of the system are important; 2. Evolution can achieve multiple equilibria; 3. There is no guarantee that optimal efficiency or any other optimal performance will be achieved, due in part to path dependence and sensitivity to perturbations; and 4. ‘Lock-in’ (survival of the first rather than survival of the fittest) is possible under conditions of increasing returns. While, as Arthur notes, ‘conventional economic theory is built largely on the assumption of diminishing returns on the margin (local negative feedbacks)’. Life itself can be characterized as a positive feedback, self-reinforcing, autocatalytic process and we should expect increasing returns, lock-in, path dependence, multiple equilibria and sub-optimal efficiency to be the rule rather than the exception in economic and ecological systems (2003:661).

With these authors and concepts, I was equipped with an alternative paradigm in which to contextualise my work. Ultimately, I understood that it was Hegel’s phenomenological method of “determinate negation” (Dove 1970) that provided the all-encompassing framework to theorise my method. To place it in the larger national and global context, I realised that all I had to do was illustrate that my single case study was a sound antithetical response to the *status quo*.

1.2.4 The nested context: unpacking the problem statement at the meso-scale

In this final section of the literature review, I report on how my research into documents dealing with zoning, land use and heritage reveals contradictions. If these anomalies are not corrected, Suurbraak will follow the same unsustainable development trajectory of other towns with tragic consequences for its inhabitants and for national heritage.

We created for ourselves what I term a 'niche settlement' habitat in the small village of Suurbraak. The village is situated right under the southern rain shadow side of the Langeberg Mountain, about 20km east of Swellendam. An integral part of the research problem is that my individual problems of subsistence livelihood are similar to those of many of my fellow villagers. The village is the nested context or benchmark that I use to weigh up various aspects of my own rural-niche context against those of the conventional on-grid context.

In order to glean insights as regards rural settlement, I undertook an analysis of local municipal documents such as the Spatial Development Framework (SDF) that provides the legislative background to my nested context (Swellendam Municipality 2008, 2009, 2011). I also undertook an extensive research road trip visiting several small-scale farms in the Southern and Eastern Cape. This provided me with an understanding of our current rural landscapes and the economic situation in those areas.

The London Missionary Society founded Suurbraak in 1812. In 1960, the white inhabitants were relocated'. Suurbraak - because of its heritage of traditional, subsistence cultivation techniques and its abundance of available agricultural land - stands out from most other Southern Cape villages. This gives Suurbraak a

compelling claim to being a true agri-village alternative to the current rural settlement trajectory in these areas.

Yet, my research reveals that the planning orientations outlined in the Integrated Development Plan (IDP) and SDF for Suurbraak, which hail heritage and “small farmer development” (Swellendam Municipality 2008) as sacrosanct, are contradicted by the actual zoning and surveying practices in the village (Swellendam Municipality 2009). Subsequent expansion and plot allocations were made for the RDP low-cost housing model type, as opposed to following a model that would nurture the century-old farming heritage of the municipality. The zoning recently enforced on the village is that of Residential 1, which strictly prohibits any farming activities. The village is therefore following the same development route as the majority of other Western Cape villages. Why is this the case? When the SDF and IDP for Suurbraak are emphasising the protection of heritage, preservation of character and encouraging small-scale farming (Swellendam Municipality 2008, 2009).

I therefore explore the socio-economic implications of Suurbraak with its agricultural livelihood heritage dating back to 1812, which has - no doubt under the influence of development policies - gradually transformed into an on-grid settlement context. On-grid, as defined earlier, refers to a reliance on municipal services, government health care, household purchases, municipal housing schemes and wage income.

I would argue that this high-density interpretation of on-grid settlement, perhaps appropriate to urban areas, is a misplaced settlement model in rural areas. The high-density rural model pre-supposes that farming is not viable on small pieces of land, this ethos probably stems from Apartheid ideology that favoured minority white ownership, economies of scale, non-white labour. The government policy discouraging the sub-division of farms no doubt came about as reaction to tendency for land to be continually subdivided as populations grew. However, acknowledging

this I want to emphasise that the case study is not advocating subdivision of 1 000 hectare farms into 100 hectare farms, rather it is addressing rural settlement at the household level and diversification of livelihood opportunities provided a little more land and resources is available to householders. For instance, the case study is 1 000-square metres with 10 000 square metres of commonage. In rural areas where jobs are scarce and in a context of peak oil, self-sufficiency will surely need facilitation. I will from here on argue that this high-density low cost settlement trajectory imposed by national low-cost housing and municipal policy is the single largest threat to the last remaining vestiges of the rural subsistence heritage (mission villages) these municipal policies (Swellendam Municipality 2008, 2009, 2011) paradoxically claim to be upholding. This contradiction suggests that the key question is not people's willingness to farm, but rather whether municipalities are incorporating subsistence farming as a fundamental priority where it matters, that is to say in the zoning and development directives of rural settlements. I shall argue that legislation needs to assume responsibility for its effects in determining the scope available to would-be subsistence farmers. SDFs, IDPs and associated municipal zoning regulations dictate, firstly, that small pockets of land be made available for micro-agricultural use for poor people and, secondly, the scope of what - on the little available land - is legal and within zoning parameters. In essence, the conversation about people's will to farm can only begin once an appropriate space is created to facilitate the process.

1.3 Structuring the research

1.3.1 Research question

The authors I have studied provided me with a purpose (to develop, personify and articulate an antithetical position to the prevailing global, economic system reliant primarily on the commoditisation of nature); an epistemological framework (the interrelatedness of all life and progress seen in terms of continuing dialectical

processes); and an overall methodological approach (an acknowledgment of complexity, inclusivity, the researcher as subject, and the Hegelian concept of determinate negation). All of these resulted in the research question below, in which "off-grid" and "self-sufficiency" refer to our niche project and its motivation; "sustainable alternative" assumes an antithesis to the economic *status quo* mentioned above; "rural" locates the study; and "determinants of success" speak to the Hegelian method of determinate negation:

Is off-grid self-sufficiency a sustainable alternative for rural livelihood? If so, what are the determinants of success for such an alternative?

Before I could formulate this research question, I needed to identify and understand the core problem as manifesting at the interface between the micro- (niche case study), meso- (village) and macro-level (RDP-type developments bordering rural towns, signs of ecological stress, globalisation). My question to myself was, "How could my project and associated research help to reverse the metabolic rift separating humans from nature?" We sensed that the solution required finding a way to reconnect with nature, thereby becoming less dependent on fossil fuel (metabolic unification). We decided therefore to forfeit the comfort and convenience of our urban, cosmopolitan lifestyle and to attempt to live sustainably off-grid.

Fukuoka advocates a 1 000-square metre smallholding as the ideal size for an easily manageable farm: "The more the farmer increases the scale of his operation, the more his body and spirit are dissipated" (Fukuoka 1992:110). After some searching, we found and purchased a 1 000-square metre unserviced allotment in Suurbraak that we felt was ideal.

Constanza (2003) recommends having a vision. However, we lacked good examples to emulate. This compelled us to go another route; namely, to imagine a clean slate or "Ecotopia" (2003), into which we could nest a vision built around our broad aims. These included owner-building our house using natural, local materials; producing

our own organic food and beverage and managing our personal primary health with the use of medicinal plants that we would grow ourselves; harvesting our own energy and water; and managing our own waste.

After articulating a vision, Constanza recommends a process of reflective research and development that he terms, “pragmatic modelling philosophy” (2003), which would guide how we gradually gave substance to our original aims.

It is generally understood that models need to be testable, repeatable, predictable and as simple as possible. However, my own experience was that this is an unrealistic expectation when it comes to dealing with complex and real life ecologies. Constanza (2003) echoes this view when stating that “biocomplexity” is not always conducive to repeatability. This was borne out by our own experience, in that there were hundreds of variables at play on our piece of land, meaning that any attempt to make our vision conform to external general systems’ theory (Bateson 2000) would have been impossible. Our case study, being site-specific, was therefore particular to a lived ecology, which is inclusive. In order to comprehend our situation, we needed to expand our thinking to become ever more inclusive.

> Science, in both the logical positivist and in this new “pragmatic modelling” vision, works by building models and testing them. But the new vision recognizes that the tests are rarely, if ever, conclusive (especially in the life sciences and the social sciences), the models can only apply to a limited part of the real work and the ultimate goal is therefore not “truth” but quality and utility. In the words of William Deming “All models are wrong, but some models are useful” (Constanza 2003:656).

I originally conceptualised this case study as an off-grid “multifunctional agro-ecological model” (Amekawa, Sseguya, Onzere & Carranza 2010), which would be best analysed from a general systems’ perspective. Bateson highlights the importance of understanding the discrepancy between the model/vision and the reality on the ground (Bateson 2000). Any model is therefore problematic because of this underlying discrepancy with reality. Bateson sees this discrepancy as a “degree

of abstraction", the degree of abstractions increasing evermore in relation to the distance from the "on-the-ground" reality.

My initial thinking on how to formulate a suitable research question based on general systems' analysis proved unsatisfactory because the prerequisites for a good model - namely repeatability and simplicity - could not be superimposed, as they would distort the integrity of the system. The inherent complexity of the system represents its underlying strength after all (Bateson 2000). On reassessment, I had to ask myself two key questions before being able to formulate an adequate research question: what is my individual methodology and how do I manage the contextual biocomplexity upon which the case study is based?

I concluded that these key questions could be addressed using the "determinate negation" (Dove 1970:623)[10] methodology associated with Hegel.

While in this process, I felt it necessary to deepen my understanding about the issues involved by undertaking a road trip to interview a number of identified successful farmers, who, like us, were living self-sufficiently, in order to establish if there were any commonalities that might determine their success. I broadened this line of enquiry with respect to the local agrarian context in Suurbraak. The road trip interviews and Suurbraak agri-village analysis partially affirmed that we were on the right track with respect to our own off-grid niche project. However, to my mind, this affirmation was too vague and not particularly useful in that I wanted to drill down to unearth the key determinants of success. As mentioned above, I believed that the most appropriate tool or methodology to achieve this outcome was to apply "determinate negation to all the aspects of our project, as it had unfolded over the previous three years.

Very briefly (elaborated in chapter 2), "determinate negation" required that I break down each of our original aims (owner-build using natural, local materials; producing

[10] All future occurrences of "determinate negation" will be a reference to Dove (1970:623).

our own food, beverage and medicinal plants; harvesting our own energy and water; managing our own waste) into its constituent parts. Each part was informed by theory, which was treated as my thesis. The process of implementing the theory onto the land invokes a dialectic between the land and me, the practitioner. Through the process I document how the theory once implemented (made determinate) is most often negated (fails). In this process, a negation provokes a response and kicks into motion the interminable cycle of determinate negation until a sound resolution is contextually discovered. I noted carefully the results that were triggered by the ensuing dialectic, in order to discover whether the intervention thus created elicited dissonance or whether what flowed from it confirmed that our interventions were sound. If the former, then the ensuing void usually led to new insights that were triggered, not by the intellect, but usually by elements (or spirit) pertaining to the context. If the latter, then I concluded that our interventions were sound and could therefore represent success.

1.3.2 Rationale for the study

My rationale for this study is rooted in a sense of the responsibility I feel that goes with associating myself with the term sustainability; in other words, I believe that it must start with me before the study can hope to have any legitimacy.

Consequently, this study articulates a antithetical response highlighting the risks we face from the *status quo* (depleted resources, poisoned food, mutant nature manifesting as inexplicable diseases); locating the causes (profit motive, greed, multinationals, scientific approach to nature, metabolic rift); and documenting, discussing and reflecting upon the appropriate approach (approach nature philosophically, hands on, practical, as in ‘letting the land speak’, epistemologically sound, rooted in context and guided by a dialectical approach to reality).

Furthermore, this study is strategic in that it advocates a list of key determinants appropriate to this antithesis settlement approach; these could be used by municipal

officials as criteria to ground and guide policy formation and implementation with respect to land-use planning, zoning and heritage preservation.

1.3.3 Research objectives

The study has two overriding objectives. Firstly, to analyse a single case of small-scale off-grid settlement in Suurbraak, in the Swellendam magisterial district of the Western Cape, using a Hegelian lens and a process of "determinant negation" in order to arrive at a list of key determinants for success applicable specifically to this operation, which may be relevant to other contexts. Secondly, to hypothesise an ideal niche model for sustainable rural human settlement that represents an antithesis to the current rural settlement regime and that might embody elements applicable in other settings.

Ancillary to and informing the first objectives introduced above (analysis of a single case small-scale settlement in Suurbraak), there are further objectives, listed below (not necessarily in order):

- Explain how the literature I studied and discussed (in the literature review) brought me to a recognition and understanding of the dialectical nature of reality currently manifesting on our planet (macro, global, profit-driven, rapacious, arrogant, unsustainable) and the opportunity it opens for antithetical interventions such as ours (micro, individual, personal, intimate, humble, intuitive, sustainable) that promise a new synthesis.

- Report on a road trip during which, using a questionnaire, I interviewed a number of small-scale, off-grid farmers in the Western and Southern Cape identified by agricultural extension offices, in order to find out whether there are commonalities that might broaden my understanding of what it takes to sustain livelihood on relatively small pieces of ground.

- Report on small-scale farming within the immediate vicinity of our own project in order to see whether this might not also broaden my understanding of what it takes to farm successfully in a local context.

- Establish whether current legislation supports or works against the determinants for success that flow from the first objective above, generated from the case study.

- Provide planners, responsible for rural human settlement design, with alternative criteria that could inform legislation, policy and highlight areas for further research.

A quicker alternative approach to achieving these objectives could have been to focus on a selection of several cases from which common success factors could have been drawn out. However, such an approach would have failed to highlight the applicability of all the successful determinants discovered at the site level while generalising across cases would be problematic as approaches to self-sufficiency are notoriously diverse in method and scale. A single case study has the advantage of providing the detail and depth essential to knowledge building, as well as portraying a transition processes towards sustainable development; a documentation of best practices would not capture this. In addition, by documenting a single case, I (the researcher) become intimately involved with the object of research, which gives me access to a particularly detailed and rich set of experiences, processes, learning and information that I am then able to share.

1.3.4 Research limitations

A major limitation to the study is that, in order to fulfil the criteria of a holistic determinate analysis embodying a comprehensive antithesis to the *status quo*, the documenting process needed to distil a diverse and complex array of subject material into its essential components, this translated into valuable data being lost.

The single case study is specific to a particular area endowed with good soils in an orographic rain belt. This optimal agricultural setting combined with the fact that it is a specific case study renders the research unique, thus limiting the replicability of the findings.

Further limiting the research is the fact that the on-site case study in Suurbraak has been privately financed with a capital and operational budget that is not equivalent to the average per unit rural low cost development equivalent. The project was financed with work in the monetary economy using an access bond. The bond was raised for the amount equivalent to the value of the property, an amount of over R200 000 for the 1 000-square metres of un-serviced rural ground. This amount was then quickly paid off through salaried work in Cape Town. The access bond was later used for liquidity to facilitate the full-time development of the project, primarily for material building expenses. From time to time, it was topped up, by cashing in a pension fund and periodically through income earned through part-time work in the mainstream economy. It is unfortunately difficult to illustrate the total cost of the project as this is a livelihood project that has entailed the overlapping of development expenses, farming and business infrastructure, sweat equity and employed labour, household subsistence and farming inputs. However, partly addressing this limitation is the fact that the case study was developed with the intention of using and pioneering techniques and equipment that require low-technical input, using readily-available materials.

Lastly, the research does not address structural issues that govern and consolidate the existing on-grid settlement context such as communities lobbying for low-cost housing, exorbitant land values blocking the poor from land acquisitions, and ecological issues associated with people living off ecosystems, the historical tendency for land to be sub-divided into uneconomical units. These and other topical issues are valid determinants to rural settlement that would constitute areas for

further research, these determinants would then need to be weighed up against the alternative rural settlement scenario suggested by this case study.

The following chapter elaborates my interpretation of Hegelian methodology as applied to the thesis methodology; the case study is subsequently detailed.

CHAPTER TWO: Conceptual framework

This chapter treats the research question (2.1) as a narrative (2.2). Thereafter I discuss my research methodologies (2.3) comprising a single case study (2.3.2) making use of determinate negation (2.3.1), pragmatic modelling (2.3.2), action research (2.3.2), and semi-structured interviews (2.3.3). I conclude with a reflection on the limitations of my methodology (2.4).

2.1 Research question

My research question articulates a four years research journey into whether off-grid self-sufficiency is a sustainable alternative for rural livelihood. If so, what are the determinants to its success?

2.2 Research narrative

The first year and phase of this research project (culminating in a B.Phil. degree) helped give substance to our decision to live out the principles of sustainability in our everyday lives by embodying an antithesis to the current situation being played out in the world today, as articulated in my literature review (1.2). This current thesis manifests as metabolic rift from nature - the rural equivalent of which is to be seen in RDP-type developments usually situated on marginal land on the outskirts of village hubs.[11] This RDP-type development pattern increasingly dictates the reality and the sense of personal place for the majority of people living in rural areas. This costly, on-grid housing model is far removed from ideals recommended by natural living pioneers such as Fukuoka, Mollison and Jenkins as it is forcing families to live in confined conditions in otherwise expansive rural landscapes. It decouples people

[11] The points raised in this section are contextually applicable to my experience in Suurbraak with statistics to validate my points, available from a Datadesk Socio Economic analysis of Suurbraak (Datadesk. 1996). This RDP-style rural settlement approach is advocated and prioritised in local municipal regulations SDFs and IDPs *(*Swellendam Municipality's Spatial Development Framework 2008 and Swellendam Municipality's Integrated Development Plan 2005*)*.

from natural eco-systems that could otherwise provide healthy homegrown food (food security) and home-based agrarian pursuits, which I term a 'natural health ethic', while making no provision for subsistence livelihoods. It assumes public transport, which is usually costly and not always available; minimum wage jobs in reasonable proximity to the settlements; and affordable food from spaza shops, cafés and/or supermarkets. It is increasingly expensive to maintain dependency upon centralised grid services for power and the provision of municipal waste management and public health care.

As an alternative, I have detailed our own holistic antithetical response guided by a principled vision (Constanza 2003). This vision is to live sustainably by building our own home using natural, local materials; produce our own organic food and beverage and manage our personal primary health with the use of medicinal plants that we grow ourselves; harvest our own energy and water; and manage our own waste.

I tested the feasibility of this vision and its associated implications during a road trip to the Western and Southern Cape when, using a questionnaire, I interviewed a number of small-scale farmers, identified by agricultural extension offices, in order to see whether any of the determinants deemed necessary to fulfil our vision also featured as reasons for their sustainability. A copy of the questionnaire I administered is included in appendix 5. I then took this line of enquiry further with reference to key determinants (proximate land and access to cheap water) through a land-use survey of Suurbraak agrarian activities as pertaining to access to these resources. The commonalities gleaned thus justify a list of seven hypothetical determinants of success. These determinants were then as much as possible facilitated and tested at all levels of the holistic case study (our own niche farming operation). Each subject heading is elaborated adopting Hegel's method of

determinant negation. This is in order to understand, adapt, refine, confirm and/or reject them as determinants of success.

Throughout this period, we lived on a small piece of ground immersed in nature where we created a 'niche', embedded in a rural ecosystem. I term this niche the 'rural-niche settlement context'[12]. Seen from within a Hegelian framework (see 2.3.1 below where I expand on how Hegel and the associated method of determinant negation informs this study), our off-grid niche experience counterpoises or is antithetical to what I term the 'on-grid settlement context'. On-grid, therefore, represents the 'thesis' while my off-grid experience represents its 'antithesis'.

Antithetical elements of our lived off-grid niche context relate to the way in which we do not use chemical fertilisers or insecticides in our food production; the manner in which we treat and slaughter our livestock; produce our energy; and manage our waste and health care. When contrasted with its taken-for-granted rural on-grid counterpart currently manifesting in South Africa, this paves the way for a "richer notion" (Hegel 2003) or synthesis of what rural living might or should entail in South Africa.

The abovementioned concepts of "richer notion" and "synthesis" should be seen as a further and deeper manifestation of "Spirit" consequential to the dialectic between the conventional notion of spirit manifesting in the on-grid settlement context and its extreme opposite: the off-grid settlement context brought into play through our project operating at individual level. It is to be noted that this study does not deal with the on-grid South African context other than to use it as counterpoise against which to contrast aspects of our own off-grid rural-niche context. As such, this study will attempt to understand and articulate the dialectical unfolding of my own struggle at the opposite extreme of the rural spectrum. If it is to succeed as a Hegelian methodological approach of "determinate negation" (Dove 1970:623) then it must

[12] 'Niche' here, and defined from a biophysical perspective, connotes my off-grid place in a local ecosystem.

engage with the sacrifices we made and the lessons that manifested themselves as we were forced to grapple with the many issues and challenges that we faced, living at the extreme opposite end of the on-grid continuum. Starting from the time that we moved onto our open plot with nothing but what nature had provided in the form of a 'natural clean slate'. This narrative documents the unfolding thinking of the layman, the urbanite armed with only theoretical knowledge about living sustainably and thus contextually ignorant. It then describes the developmental path that resulted once I had fused my own intentions with that of the land to create (using Hegelian terminology) "phenomena" represented by "determinate" contextual "acts" (Dove 1970:623). I then document how I attempted to master the core problems and show how they were acknowledged, solved and/or unsolved. The study therefore attempts to describe dialectic processes between my land and me (Gadow 1992).

The process followed was the application of Constanza's "pragmatic modelling philosophy" (2003:5) (see section 2.3.2).

However, pragmatic modelling alone was not enough, as I found much of the theory implemented did not initially work (negated) when put into practice. Each development idea implemented immediately created a situation for dialectic between me, as the practitioner and researcher, and the land. The process of contextual failures therefore needed to be incorporated into the research design. Hegelian dialectic was deemed a suitable method to address this problem (Dove 1970). When testing theory at the micro-level, theoretical interventions often proved in practice to be contextually unsuitable and therefore immediately invoke (because the answers emerge from the context rather than solely through intellect) remedial action - routed not in theory but now in practice - that then becomes the new praxis. This critical shift between theory and practice is better put in Hegelian language, as in: interventions (acts) determined false (negated) invoke a void from which deeper truths can be revealed, these new answers are operational on a deeper level of understanding

(beyond egological-centric theory in the phenomena themselves) (Dove 1970). These negations are hidden within the micro-context and as such cannot be anticipated theoretically (with hindsight they can of course be theoretically explained). The point I wish to emphasise with this research design and process is that the strongest contextual solutions are the ones that have gone through the most rounds of "determinate negation" (Dove 1970:622).

The research process spanned four years (2009-2012) and comprised the above-mentioned phases, each constituting a deeper level of abstraction that is documented in figure 1 below.

Figure 1: The research developmental time line

2008/2009	2010	2011	2012
Developing livelihood systems	**Decoupling from grid systems**	**Living off the land**	**Producing marketable produce**
food garden/barn	food	improving quality, value adding	French cheese making apprenticeship
cellar/pantry	beverage produce beer/milk	beer brewing	cheese/beer brewing for market
shelter	Alternatives to grid systems	bottling preserves	
water harvest	water harvest	drying	
solar power	solar power		
humanure	humanure		
greywater recycling	composting		
composting system			

2.3 Research methodologies

This section describes the methodologies and/or tools used as part of the overall research design: determinant negation (2.3.1), case study (2.3.2), pragmatic modelling (2.3.2), action research (2.3.2) and semi-structured interviews (2.3.3).

2.3.1. Conceptual framework: Determinant negation[13]

The conceptual methodology adopted for this study is Hegel's dialectical methodology of "determinate negation" (Dove 1970), demonstrated in this section by way of a practical example experienced on site and summarised below.

In order to give shape to our vision of living off grid we believed, *inter alia*, that we must recycle our faeces and urine. The method we adopted - suggested by Jenkins (1999) - required a bucket containing untreated sawdust that served as a receptacle, into which, whenever we defecated, we added a layer of sawdust from untreated wood, which proved highly effective in that the sawdust absorbed the odour. We emptied full buckets into a specially-constructed composting box and, again, covered with a layer of untreated sawdust. While the composting pile is being formed, thermophilic bacteria heat the contents and kill most of the pathogens (Jenkins 1999). Once the bucket is full, it is covered over and left to stand for two years to ensure all remaining pathogens have been destroyed (Jenkins 1999:63). The system worked well until one day we experienced an infestation of flies that we traced back to our most recently created "humanure-composting" pile.

My immediate reaction was alarm and panic. I had visions of neighbours complaining, health inspectors demanding that we shut down our system and zoning inspectors ordering us to cease farming. A kneejerk response to determining a successful solution, antidote and/or antithesis to the problem could be to spray all the newly-hatched flies with insecticide, but insecticide is not aligned with our principled vision and would additionally kill the thermophilic bacteria and other organisms that are converting our human manure into compost to feed our trees. I therefore decided to reject this solution as inappropriate.

[13] Hegel's *Phenomenology of Mind* is complex and there is not a conclusive interpretation of his work. This assessment is therefore an interpretation and summary that follows from my personal understanding of Hegel's work complemented by a number of critiques.

A second intervention (one of multiple implemented remedial measures tested) that might determine a successful solution, antidote and/or antithesis to the problem was to seal the composting pile with sand, which required us to start a second pile that might also breed flies and so our problem would not have been solved. This was only a partial solution and ultimately it was determinately negated because it was a short-term measure.

I was standing at my compost pile at my wit's end not knowing what to do next when my attention turned to what I was holding in my upturned palms: composted humanure from an earlier batch created in winter. Suddenly the broader context of which I am part supplies me with an answer: use the composted humanure and spread it thickly over my most recent pile of humanure, which I then proceeded to do and which, to my delight, suffocated the newly-hatched flies without shutting down the composting processes, but in fact enhanced it. This solution, therefore, proved a key determinant in the successful implementation of our goal of managing our own waste and thus ensuring that we were not poisoning our planet with insecticides nor robbing her of vital nutrients. The solution thus ensured the integrity of our principled vision.

According to Hegel, a "concept" (for instance the information around humanure composting that I obtained from reading Jenkins (1999) is knowledge while the "standard" for this knowledge is the "object" (for instance the growing pile of humanure compost in a storage receptacle on our plot in Suurbraak); consciousness makes a distinction between the two (Dove 1970). If the standard (object) and the concept (knowledge) do not correspond (for instance, I see hundreds of baby flies crawling out of my pile of humanure compost), then consciousness must adjust knowledge appropriately. This affects and therefore gives rise to a new standard, illuminated by 'emergent insight' (keep all my humanure composting piles covered by a thick layer of composted humanure from an earlier batch). This, in turn, is itself a

new concept of humanure production and can, therefore, be seen as a synthesis of the original thesis (cover humanure with untreated sawdust) and its antithesis (flies crawling out of my humanure compost). Therefore, new objects are not created by the philosopher, but rather emerge through experience or the dialectic between consciousness and material (Dove 1970).

Hegel's dialectic pre-empts (as in 'appropriates') this process, in that it anticipates that the original preconceptions of knowledge will ultimately prove to be misconceptions. The terminology Hegel uses to describe this process is "determinate negation" or "the path of doubt" through experience transformed into "the way of despair" (Dove 1970:623). However, the issue runs deeper than this because for Hegel the process of consciousness itself is dialectic (Dove 1970). Therefore, each infinitesimal intervention that resolves composting humanure at the microcosm is not only a dialectic at that level, but represents dialectic applicable to the macrocosm as well. This is the profundity of it. If the thesis (concept) is, for instance, flush toilets but we know the thesis to be faulty due to water scarcity (its standard) and, despite this, regulations only accommodate solutions that involve flushing (the regime) then we have a lopsided cultural setting where there is no provision for the antithesis (which may in fact harbour the hidden solution to the macro-problem). However, as soon as the antithesis is embodied in a new concept, composting waterless toilets, then the new corresponding standard needs to be made determinate. This can only happen at the microcosm. Nowhere else is this possible. However, from the point of view of old regime (regulations), what is of relevance is not whether the antithesis is right, but that it is negated. That is, if the concept is the reasoning behind the regulations then the negation of the antithesis is the regulation's affirmation. Following from this, the points below can be noted:

- The negation of the antithesis is central to maintaining the *status quo* (regime/thesis).

- The negation of regulations (a new concept) is necessarily reliant on the embodiment of appropriate antitheses at the microcosm (a new standard) able to illustrate the virtues of niche settlement; the case study is arguably representational of this. If interventions at the microcosm are negated this is not to say that, through the process of negation, new insights (solutions), will not emerge in the microcosm. A negation of negation can lead inexplicably to an affirmation (Dove 1970).
- If so, these new insights have power in that they then affirm the antithesis, this paves the way for doubt because it entails that the old standard, flush toilets, is now challenged by the new antithesis that is increasingly gaining traction; the notion that composting toilets are viable with certain unearthed proviso's.
- For Hegel, this process of focusing inwards at the microcosm would entail that the new concept of composting toilets increasingly becomes its own standard (Dove 1970); it exists. The concept is now synonymous with the standard, it is made phenomenon and therefore rendered true.[14]

The notion of "determinate negation"[15] can be described as follows: through experience, consciousness negates the first object. The new object thus created is not constituted by or a consequence of reflection, but is determined by or in the vacuum created when the first object is negated (Dove 1970). A precondition to the phenomenological methodology is that the experience must "appear" (Dove 1970:623). Consciousness however imposes a distinction between appearance and reality or knowledge and the standard. The subject through action alters appearance but also alters reality (Dove 1970).

[14] According to Dove, Hegel's "concept" and "standard" are devices of consciousness so the concept can be superimposed on anything including its own standard (1970).
[15] The concept of "determinate negation" is progressively appropriated and all future occurrences in the text will refer to the concept as described in Dove and used as applied to the case study (1970).

What is implied here is that concepts (for example theory) are unlikely to match their contextual standards except through the path of adjustment via determinate negation. However, one doesn't just abandon an intervention when a negation crops up (the problem demands remedial action); the negation itself stimulates a response. These responses, if appropriate, increasingly match the concept with the standard, which is the power of working at the microcosm. These insights are contextually hidden in the determinate and this implies that they would necessarily rely on different or unexpected determinants. For instance, in view of our example above, the regulations are a determinant as I could be heavily fined, which is a disincentive applicable to the intervention. As a determinant, because they make no provision for these solutions to arise, they restrain progress of the antithesis (composting toilets). This whole process illustrates the importance of a single case study approach that seeks to embody a holistic antithesis; each successful intervention at the microcosm brings into question its opposite, namely the regulations, which enforce the dominant thesis (regime).

The above process, which leads to insight, has been interpreted from within a Hegelian framework or epistemology, described and expanded on below.

Perhaps the best way to approach Hegel is via the Neo-Platonic description of three levels of consciousness mentioned earlier, whereby: level three represents the material world, level two the mind and level one the divine or spiritual (Shaw 1985). Grasping Hegel's dialectic requires acknowledging that there might be an emergent relationship between these three levels. In fact, the actual structural progression of Hegel's *Phenomenology of Mind* (2003) is indicative of this process (Stewart 1995), as illustrated by the following extract:

> The true philosopher must strenuously avoid the temptation of interpreting the 'Immanent' development of the subject matter by the interjections of interpretive models; he must rather give up this instinctively felt prerogative or 'freedom' and instead of being the arbitrary moving principle of the content his task is to submerge this freedom in the content and let the content be moved through its own nature (Hegel in Dove 1970:615).

Hegel seems to be suggesting that “interpretive models” are limited; therefore, a distinction needs to be drawn between “knowledge” and “truth”. Knowledge is “to be for consciousness”; the phrase adopted for this is “being-for-another”. On the other hand, “Being-in-itself” is truth manifesting (thus becoming the determinate reality) (Dove 1970).

However, it is a mistake to assume determinate negation is solely a process of negating an original thesis. Reiterating the leading quotation to this section is helpful in highlighting this point: “The true philosopher must strenuously avoid the temptation of interpreting the ‘Immanent’ development of the subject matter by the interjections of interpretive models…” (Hegel in Dove 1970:615). What Hegel seems to be alluding to here is that the appropriate dialectical process is more than an interaction between mind and material; there is a third component - that of “Spirit” - that is realised by restraining the mind. We are therefore not protagonists, in that consciousness realises its true nature as integral to the process: this happens according to Hegel, when appearance matching essence realises spirit (Dove 1970).

I believe Hegel’s dialectic is therefore not an internal process that is engineered by a rational discursive arbitrator: “Meaning remains a myth and learning remains paradoxical as long as the ultimate subject is taken to have the ego-logical structure of consciousness” (Dove 1970:623). The interpretive component of mind is overly presumptive: “At a point we relinquish duality ‘we’ no longer interfere with consciousness ‘our contribution’ becomes the pure act of observation, this represents the second stage, ‘the authentic science of spirit’ the essence of consciousness is grasped” (Hegel in Dove 1970:624). Interpreting Hegel’s words, Dove further comments: “Thus spirit appears inexplicably through the undiscriminating process of manifest experience. Consciousness disengaged from

the ego moves with its own spirit. Consciousness has grasped itself as wholly independent" (Hegel in Dove 1970:624).

The problem, as I see it, is that spirit conceived as an 'other' to the internal rational discursive mind, means that the concept of 'Spirit' can therefore not be described in a rational discursive manner. There is thus the difficulty of defining 'Spirit'. Is it a collective spirit or an individual spirit or is it both? Hegel seems to indicate that it is both:

> … society, having reached this ultimate stage of realizing universal objective spirit, invokes its opposite (antithesis) 'individual subjective'. This opposite necessitates the destruction of this universal 'ethical spirit' in society. Spirit thus abandoned at the universal objective level, can only find refuge in the individual (local) (Hegel 2003).
>
> … since then its trust is broken, and the substance of the nation cracked, spirit, which was the connecting medium of unstable extremes, has now come forward as an extreme… This negative activity has turned the element of pathos into its own material, and given itself its content; and this unity comes out as a work, universal spirit individualized and consciously presented (Hegel 2003:414).

Spirit can thus be tentatively defined as that, which is an 'other' to the internal processes of rational mind. Spirit is thus recognised in undiscriminating experience of manifest phenomenon (reality or truth). As such, Hegel's dialectic is not an engineered process of mind but a naturally 'manifested' process of spirit moving between opposites. The new object is not solely constituted out of reflection but is determined by, in or through the vacuum created when the first object is negated (Dove 1970).

The determinate negation process is narrated in chapter 4 under the following consecutive headings.

- Title
- Theoretical aim and philosophy
- Theoretical research period

- Theoretical problem statements identified
- Theoretical theses
- Practical implementation, testing and problem identification
- Determinate negation of original theses
- Practical determinate truths (new theses or anti-theses or syntheses).

2.3.2 Research approach: Case study, pragmatic modelling and action research

The single case study is conceived and implemented according to Constanza's "pragmatic modelling philosophy" (2003:5), which is then merged with Hegel's dialectic via an action research approach, which is "rooted in the concerns of practitioners in real-world settings and is a disciplined self-evaluation and reflection" (Carr & Kemmis 1986). The developmental process was pragmatic modelling applied to my own research and development. Constanza outlines the process a: vision, research and finally implementation (2003). In terms of my vision, I pictured an off-grid sustainable smallholder livelihood on a vacant piece of land. I then researched what this would entail (theory) and then implemented and tested the model in practice (action research). Both Constanza (2003) and Gadow (1992) emphasise the lived emersion approach to action research. However, in order to further justify my personal lived interpretation of the single case study initially envisioned, I conducted a series of interviews with farmers operating regionally on a small scale, this approach is endorsed by Mukhija (2010) in a journal article titled, *N of One plus Some: An Alternative Strategy for Conducting Single Case Research.* In the journal article, the author endorses the single case approach for focused studies and multiple cases for broader studies, with the proviso that the single case study would be well informed by multiple secondary cases. In this study, this point is facilitated by the small farmer interviews I conducted (see appendix 5).

The focus is on implementation as qualitative research (Mouton 2011), both Constanza and Bateson emphasise the “principled vision” (Bateson 2000, Constanza 2003). This focus on principles combined with the problem of “bio-complexity” render a quantitative approach impracticable, as I discovered the conversion of theory into practice is often ineffectual. A qualitative approach allows for the flexibility needed to arrive at determinate solutions whereas a quantitative approach would demand detailing the variables and final objective beforehand. The biocomplexity of the case study would make the latter method very limiting. What ensued merged process with my personalised interpretation of Hegel’s dialectic (refer 2.2 above and 2.3.2).

2.3.3 Methods

a) Case study: niche settlement.

The single case study stems from a four-year lived self-sufficiency, action research developmental project in the village of Suurbraak, implemented from scratch on a 1 000-squaremetre virgin plot. This approach comprises a qualitative narrative within a Hegelian phenomenological framework applying “determinate negation” theory (Dove 1970:623), with the objective of unearthing and focusing on the core systemic nodal issues experienced in practice, ‘on the ground’ as it were, at the microcosmic level.

b) Semi-structured interviews

Eighteen successful semi-structured interviews were held with municipal officials and farmers. The principles underlined by Barribal and White (1994) in terms of allowing a natural flow in the discussion, respecting social ethics and being constantly aware of the interviewee’s perception of me as a researcher were adhered to as much as possible to ensure the collection of viable information.

Municipal officials were interviewed in order to confirm or negate queries raised primarily from researching IDPs, SDFs and zoning regulations. My key respondents

at the municipal level were James Engel, Deputy Director of Community Services Swellendam Municipality; Willie Hattingh, Town Planning and Building Control Swellendam Municipality; Christi Lawrance, Land Care Swellendam and Ernest Guder, Agricultural Advisor (facilitating local land reform in Oudtshoorn). Questionnaires were compiled around issues pertaining to my interpretation of official documents and these were then discussed with the relevant municipal officials (See annexure 4 for summaries of the interviews).

Fifteen small-scale farmers were successfully interviewed during a road trip spanning various climatic zones in the Southern and Eastern Cape, focusing on five municipal agri-areas: Swellendam, Oudtshoorn, Uniondale, Willowmore and Beaufort West. These were selected as local areas that covered a large diversity of climates and terrains. The ecozones visited include the Cape mountains and fordlands, Albany thicket, succulent Karoo and Nama Karoo (Thomas, Moll & Grant 2008). The approach employed was to meet municipal officials - preferably local agricultural extension officers - and to ask them to indicate where successful small-scale farmers could be found.

One aspect that proved challenging pertained to the definition of “small-scale farmers” in such broad climatic terrains; for example, a small farmer in the Great Karoo desert farms 1000 hectares whereas in Suurbraak the average farm size amounts to less than a hectare. Therefore, my approach included asking the respective extension officer about farmers operating at the very margins who truly lived off-the-land. With my list from the extension officer I then tracked down the farms using detailed maps that indicated farms and farm numbers, I approached farmers with a questionnaire that had an abbreviated and detailed section - see questionnaire (in annexure 5). If farms were deemed suitable and interviewees receptive I went through the detailed list of questions recording their answers by hand. If I sensed interviewees where taking offence, when probed about their

livelihoods, I politely skipped through the abbreviated questions before moving on. I wanted to find those rare small-scale farmers in order to discover how they made a living off relatively small pieces of ground, which farming techniques they employed, and what was needed to achieve financial sustainability. Although most farms were not off-grid the hope was that after gathering the data through semi-structured interviews, I would be able to analyse the data in terms of the common attributes that emerged across the spectrum of interviews, however taking into account problematic differences in terms of background, access to resources, scale and grid services. The aim was to have a greater understanding of local, regionally-specific small-scale farming techniques for livelihood. Juxtaposing municipal areas and climatic zones provided a diverse overview of small-scale farming on a regional level. The route followed included back roads that are rarely travelled thus opening up opportunities for discovering isolated and fascinating examples of successful small-scale farmers.

c) Letters of correspondence with municipal officials

Letters were written to the Swellendam town planner and Municipal manager, with the intent of detailing what I deemed contradictions in municipal documentation gleaned from analysis of local municipal documents such as the SDF's, IDP's and Integrated Zoning Plans, these provide the legislative background to my nested context (Swellendam Municipality 2008, 2009, 2011). The letters (see appendix 3) are mostly pertaining to zoning issues and community access to natural resources.

d) Survey: land use in Suurbraak

The research road trip confirmed Suurbraak village as an appropriate rural settlement context for analysis.

To highlight the appropriate issues as regards self-sufficiency, I conducted a survey focused on agrarian land use in Suurbraak, with specific focus on the cultivation activities being undertaken in proximity to the village hub. This took place in the

summer season of November 2011, the seasonal agricultural peak period of the year.

The main determinant informing the selection of the survey plots was the accessibility or not to irrigation water. This constituted a key discriminating factor in defining my sample because my hunch was that the tendency to cultivate was determined by access to cheap water on the proviso that the landholding was already in a secure setting where cultivation could be monitored. In order to apply this criterion, I used a process of elimination; I did a visual inspection on foot earmarking the areas where most agricultural activity was apparent; I then outlined the areas that had access to municipal irrigation water on village erf maps ensuring I had households with and without irrigation water in my sample. The plots selected for the survey therefore include those located on both sides of Suurbraak's main road as they fulfilled the above criteria. Farming activities taking place on the north side of the Buffeljags River, on the 2755 hectares of Rietkuil commonage, and the low-cost housing area of the village were excluded even though there are still a few people farming in these areas.

The survey is therefore not to be understood as reflecting the extent of agricultural activities in Suurbraak. It is designed to indicate willingness to farm, as regards three primary criteria, stated below:

- The homestead is on or near the farming allotment;
- The farming allotment is large enough to be considered a smallholding or put to agricultural use (1 000-square metres);
- The farming allotment has access to cheap irrigation water.

To capture the information I embarked on a visual inspection of each of the homestead allotment in the sample area, I first made a broad distinction between homesteads having access to irrigation water and those that didn't (questioning

inhabitants living on the fringe of the water haves and have-nots line, to ensure accuracy). Within these two categories, the category ‘no farming activities’ was divided into ‘white-owned no farming’ (as many white inhabitants use these houses solely as a holiday destination) and ‘for sale’, as people selling their land are less likely to invest in agricultural practices. The agricultural categories were divided into those cultivating only, those grazing livestock only, those doing both, and, in some cases, undertaking other activities such as selling wood. The categories selected illustrate the various land-use parameters, A weakness of this method is that land left fallow would be indicated under no farming for that 2011 spring, although this land in many cases would be lent out for grazing on a later date. The results were tabled using the format illustrated in table 1 below.

Table 1: Homestead categories for research framework

Inhabited homesteads with irrigation water and farming allotments	
Total	
No farming	
White-owned no farming	
For sale	
Cultivated land	
Livestock grazing	
Multiple agrarian livelihood land usage	
Other non-agrarian livelihood land usage	
Inhabited homesteads with no irrigation	
Water and farming allotments	
Total	
No farming	

White-owned no farming	
For sale	
Cultivated land	
Livestock grazing	
Multiple agrarian livelihood land usage	
Other non-agrarian livelihood land usage	

2.4 Methodological limitations

The methodological design and tools adopted to conduct the research have proven satisfactory and successfully provided me with the evidence required to articulate this study.

However, methodological aspects emerged as potential limitations to single case study research, notably in terms of the possible omissions and inaccuracies of the research. These limitations are captured below.

Firstly, the most important limitation pertains to the fact that the off-grid rural niche model depicted in the study is a single case study that can only be assumed functional in an optimal agricultural setting. These optimal factors are related mostly to contextual issues relating to favourable climate and soil in the Suurbraak area. The case study area is endowed with an all-year orographic rainfall, thus making rainwater harvesting for the household a viable option. All agricultural land on the northern side of the village has access to cheap irrigation water. In a drier climate, this approach wouldn't function (a borehole could however easily be substituted for water harvesting but the sustainability of this practice would be site specific). Furthermore, the case study area is endowed with very good agricultural soils, characteristic of a floodplain making the soils fertile, and non-mechanical agricultural practices have also contributed to preserving soils. All this contributes to making living off a small parcel of land viable. These environmental factors also highlight a

problematic assumption in that the study assumes that living off the land, metabolic unification, is environmentally sound. It is hoped that describing the case study in detail, will at least contextually justify this assumption.

Another limitation pertains to the fact that the on-site single case study in Suurbraak has been privately financed with a capital and operational budget that is not equivalent to the average per unit rural low cost development equivalent. The argument made in favour of self-reliance could be watered-down by this reality, although one could counter-argue that as off-grid settlement was an object of research, it required an independent source of funding. The paradox of a self-sufficient operation being funded by external capital is however partly overcome by the fact that all techniques used called on low-cost technologies; that the materials were natural and mostly readily available (and therefore inexpensive); and that most of the equipment required manual labour as opposed to conventional power.

The research method exclusively focuses on the off-grid context and does not address structural issues that determine the existing on-grid settlement context. Discussing the determinants of on-grid settlements and contrasting them with off-grid settlements would have added depth to the thesis, but this was not the object of the thesis and could be addressed by further research.

Lastly, regarding the interviews, from an ethnographic perspective, it is important to acknowledge the risks and limitations associated with conducting research with informants with socio-economic backgrounds different to that of the researcher. Racial differences, especially in a post-Apartheid context, can at times compound a lack of trust from the interviewee towards the interviewer. Such differences can certainly create a risk of “non-response” (Barriball & While 1994), in the form of undisclosed or partially-disclosed information.

The fifteen farmers interviewed were willing, and within the bounds of their characters, open to personal disclosure.

Chapter 2 looked at the research design as a whole with particular attention paid to research methodologies. The next chapter looks at the theory informing the case study.

CHAPTER THREE: Unearthing the determinants to subsist

3.1 Introduction

This chapter forms a background to and justification for the single case study detailed in chapter 4. The reader is reminded that the core purpose of the case study is not to prove that the niche settlement approach is a more appropriate rural settlement approach, but rather to illustrate a detailed antithesis to the high-density, on-grid rural low-cost housing approach (the dominant rural settlement regime).

This antithesis embodied in the microcosm was at the outset therefore conceived as a reaction to the dominant regime. ‘Conceived’ implies that the reaction followed a particular ordered developmental process. It was at first only an idea that was developed by a literature study over a number of years. However, the literature is an empty abstraction unless it is embodied in reality, in other words manifested in a case study. This formed the second step, that of converting theory into practice (living according to the sought-after principles in metabolic unification). However, an inward-looking single case study invokes again a new reaction, this brings one to the third research component; are there not perhaps multiple examples similar to the case study that share the same determining characteristics?

The above illustrates a research timeline (see research development timeline (figure 1)), which is literature leading to the single case study, which led to seeking of multiple examples. This chapter does not however follow the timeline sequence portrayed above rather it inverts it. This inversion is to facilitate a logical zooming-in process: from region, to village, to the microcosm case study. The first section starts with a regional road trip earmarking examples of small-scale agrarian settlement, the next section focuses on the agri-village context and, finally, the third section

discusses implementing the raw untested theory on an open piece of land. This distortion of the actual sequencing is warranted firstly because, from the outset, it illustrates that the antithesis embodied in the case study is not a singular example; there are multiple examples with similar and therefore valid attributes. Secondly, it allows for the identification of common themes between these examples. Thirdly, it illustrates examples of best practice within these examples and fourthly, and most importantly, it highlights a different set of determinants applicable to similar self-sufficiency examples. This last point, common determinants, is the critical outcome of this chapter because these determinants are tested on the case study in the next chapter. The process of unearthing the common determinants followed in this chapter is critical because these determinants are unique to the antithesis settlement approach; therefore, they are necessarily a different set to those that bring about the dominant rural settlement regime.[16]

The seven determinants, which emerge from the discourse of this chapter, are:

1. Surveyed small parcels of available land, available to farm for long duration;
2. To maximise potential there should not be overly restrictive and costly laws and regulations stifling livelihood activities and market access;
3. A homestead on or near the farming allotment;
4. A farming allotment large enough to be considered a smallholding or put to agricultural use (>0.1 of hectare);
5. A farming allotment with access to cheap irrigation water;
6. Access to inputs (commonage and/or bought in); and
7. A source of manual labour and financial income.

[16] This last point illustrates a potential approach to universalise the antithesis (if this was so desired).

3.2 Road trip searching for local indigenous self-sufficiency examples

Municipal agricultural areas targeted for this field trip were Swellendam, Oudtshoorn, Uniondale, Willowmore and Beaufort West. These were selected as local geographically-connected areas that covered a large diversity of climates and terrains. The eco-zones visited during the trip include the Cape mountains and ford lands, Albany thicket, succulent Karoo and Nama Karoo (Thomas, Moll & Grant 2008:21). The approach employed was to meet municipal officials from each agricultural area - preferably local agricultural extension officers - and to ask them to indicate to me on regional maps (illustrated with farms and farm numbers), where successful small farmers could be found. It was problematic to define what a small-scale farming operation was within such a broad climatic terrain. For instance, a small farmer in the Nama Karoo desert farms over 1000 hectares. Therefore, my approach was to ask the respective extension officer about farmers operating at the very margins, those who truly lived off the land. I wanted to try to locate good examples in order to discover how farmers (if any) made a living off relatively small pieces of ground, what farming techniques they employed and how much land was needed to achieve sustainability. The hope was to find indigenous examples of self-sufficiency as well as to gather data, through semi-structured interviews, of the existing rural smallholder *status quo* in these areas (see appendix 5: questionnaires).

Above this, I was interested to explore through this process if any successful examples stemming from the post-Apartheid land transformation could be included in my research scoping. In other words, I also wanted to take the opportunity to include land reform farms in my farm visits. After a lengthy email battle with the Department of Rural Development and Land Reform, I was finally sent a comprehensive list of land reform projects for each province in South Africa (I could thus identify land reform farms via the corresponding farm numbers on my map and route).

My first municipal visit was to Oudtshoorn, a district indicating a higher than average number of land reform farms. Unfortunately, I was to be disappointed. According to the local agricultural extension officer, the majority of land reform cases in the region referenced on the official list (Department of Rural Development and Land Reform 2010) were not operational. Many land reform projects for the Oudtshoorn district have in reality failed and been resold back to white farmers[17]. I subsequently realised that following up on land reform projects was not going to be a good technique for identifying successful small-scale farmers. On these grounds, I abandoned this aspect of the research. I did however interview one farmer from a working land reform share-equity farm, Johannes Coetzee on a farm near Oudtshoorn (farm listed 144). Mr Coetzee was one out of 47 beneficiaries surviving off the land. He had however no intention of sharing his hard-earned income with the other 46 beneficiaries who did not assist on the farm at all (Coetzee 2011). According to Earnest Guder, the agricultural advisor, the majority of the land reform projects failed for this reason, as, "the land reform farms are divided amongst a large number of beneficiaries, who gain nothing from their land. This majority vote is then grounds to sell the land back to white farmers in order to benefit from a brief injection of cash" (Guder 2011).[18] All the farms discussed are listed in table 2 below.

[17] I realised why the list of land reform projects had probably been so difficult to obtain. These farms, on the official lists, had collectively received millions of Rands in government support (Department of Rural Development and Land Reform 2010), whereas many farms on the list were already back under white ownership. A fuller investigation of this issue is needed but falls beyond the scope of my research objective.

[18] This constitutes an interesting research area, which ties in nicely with this master-conclusion in the sense that the original land reform design seems to have proved, over time, to be faulty and therefore to almost ensure failure.

Table 2: Status of land reform farms surveyed

Farm no	Actual farm status at time of interview	Officially listed land reform farm
159	47 beneficiaries - 1 farming	Yes
149	Bought by department with no water rights	Yes
34	Democratic vote by majority beneficiaries ended up in sale of farm	Yes
28	Democratic vote by majority beneficiaries ended up in sale of farm	Yes
159	Majority not farming	Yes
77	Evaluated but not actually bought by department	Yes
388	Equity share project	Yes
427	Rudimentary goat, pig and donkey farmers	Yes
78	PLAAS[19] project - 15 farming successfully	Yes
46	No farming taking place	Yes
144	Equity share project dairy doing well	Yes

The tabled list was drawn up based on the discussion held with the local Department of Agriculture expert in Oudtshoorn, Ernest Guder, the Agricultural Advisor facilitating local land reform in the region (Guder 2011).

3.2.1 Non-land reform small-scale marginal farmers

In total, the research road trip to all the agricultural regions mentioned above identified fifteen eligible farmers who were successfully interviewed (see appendix 6 for a list of names and contact details). The small sample is not indicative of a sample from a large population of small-scale farmers. The sample is rather indicative of how few small-scale farmers were found and identified in the scoping

[19]Institute of poverty, land and agrarian studies based at the University of the Western Cape

area. The small-scale marginal farmers were identified in the following districts: Oudtshoorn, Uniondale, Willowmore and Beaufort West. I drove hundreds of kilometres on back roads, questioning people en route, in search of these 15 farmers. I used a standard questionnaire with all. I had to adjust the questions I asked according to time constraints, language difficulties, interviewees' education level and interviewees' willingness to share information.

Most farmers claimed not to be making sufficient income off their land. Many said they were not surviving, but these assertions cannot be conclusively verified, as it was determined that many interviewees are in the habit of lobbying for financial support under the pretext of living in struggle and strife off the land. This therefore incentivises the downplaying of their actual incomes, as well as an unwillingness to share accurate and personal financial data[20]. I quickly got the impression that those complaining the most were often the ones hoping that the research would lead to some form of agricultural support. I found that people of this category were the least cooperative of the interviewees.

3.2.2 Farming method employed by the respondents

This section describes the research findings extracted from interviews (see appendix 4) and proposes a distinction for classifying small-scale farming methods observed. Two distinct categories are suggested: farms with less than 10000-square metres of arable and extensive grazing commonage and farms with more than 10000-square metres of arable land and extensive grazing commonage.[21]

[20] Contradictions in the interviewee statements led me to this conclusion.
[21] This is an arbitrary size delineation. It is used to indicate that the research determined that those with larger arable pieces of ground often tended to recognise that better economies of scale were possible by rotating vegetable production into land management.

Farms with less than a hectare of arable and extensive grazing commonage

These are smallholdings characteristic of agrarian villages, the two villages earmarked that fulfilled this criteria were Suurbraak and Haarlem.

The farmer's homestead is sited on the arable land and farmed and supplied with some form of cheap irrigation water; the house is surrounded by rudimentary paddocks (often seemingly chaotic partitions of corrugated iron) that contain livestock and embody a sophisticated but compact management system; and paddocks contain a variety of livestock and offspring, including sheep, goats, pigs, cows and chickens (these livestock are the preferred species). There is usually a barn with basic non-mechanical farming implements[22] and feed bales. Kraal manure is used on spare arable land to fertilise fodder crops that animals graze on a rotational basis. For the most part animals spend the day on marginal commonage and return in the evening to the paddocks. Homes have a kitchen garden in which a variety of fresh produce is grown for subsistence needs. Families cater for both subsistence needs and market, selling off animals as they need cash flow or if grazing is scarce, such as during a drought.

Farms with more than one hectare of arable land and extensive grazing commonage[23]

In this case, farmers are more inclined to grow vegetables for market; arable land is divided up between fodder and vegetable patches that are ploughed most often using draft horses[24] and planted to vegetable crops on a rotational basis. A typical rotation would be vegetables followed by fodder crops, fallow/grazing, apply kraal manure and plough before returning to vegetable production. Usually friends are

[22] Less than a hectare distinction facilitates non-mechanical farming practices.
[23] This is an arbitrary size delineation. It is used to indicate that the research determined that those with larger arable pieces of ground often tended to recognise that better economies of scale were possible rotating vegetable production into land management.
[24] Some farmers used tractors.

employed at harvest time to harvest and pack produce. In most cases, livestock and produce are sold to the local agricultural wholesalers (cooperatives) and not direct to the public. In many cases, the produce sold offsets the farmers' 'cooperative' accounts that have accumulated from purchased inputs (often there is little surplus income remaining). Some farmers have vehicles (bakkies) and sell their fresh produce at markets direct to the public.

The farmers selling at markets direct make more money from their land. Many farmers cited their livestock as their 'piggy bank' for covering abnormal expenses. Most farmers had quite modest requirements for domestic consumables amounting to usually less than R3 000 per month. Electricity and fuel were the most pressing expenses. Most successful respondents had not received individual government support; however, government interventions for supply of irrigation water were highly valued. Where such farming was taking place, irrigation water was readily available.

Two farmers stood out as truly successful, namely: Simon Airies and Andre Cilliers. Mr Airies (Airies 2011) from Matjierivier district in the Outdtshoorn municipality[25] owns very little land himself, however on what he does own he has developed and invested for maximum efficiency. This includes a variety of paddocks for managing his diverse livestock and breeding operations, a barn for farming implements and farming assets, a tractor, mower and bailer. On the rest of his arable land - 20 hectares mostly rented from other farmers - he grows all his fodder requirements to run his dairy, and rents spare land from other farmers for additional requirements. His arable grazing land is used by his 18 dairy cattle to produce milk to the value of R8 000 per month. The grazing cows are followed by sheep, as they eat the shorter grass in a different manner. Boer goats are fattened on the dry marginal commonage behind his house. Mr Airies has been farming all his life. He is part of a so-called local coloured community, but he and a few other coloured families in the area are an

[25] This farm is on the books as a land reform farm but, actually, the owner had been farming the land prior to the Group Areas Act (1950) and was not subject to removal from the farm.

example of a rare oversight by the former Apartheid government[26] in that they were fortunate enough not to lose their land due to the Apartheid Group Areas Act (1950) and other discriminatory legislation.[27]

Another exceptional farmer found on route was Andre Cilliers (Cilliers 2011). Mr Cilliers is not exceptional in that he is a so-called white farmer, but rather as he is a white, small-scale farmer, a rare distinction. Mr Cilliers farms in Nieu Bethesda near Beaufort West and employs basically the same farming model as Simon Airies. However, he turns over R30 000 per month on less land. He does this by selling his products not to a middleman but direct to the public from his home. Mr Cilliers has overcome the complex and costly bureaucratic hurdles involved to be able to sell direct from house. Achieving this is an arduous and expensive procedure, as described below. Mr Cilliers had the resources and knowledge to alter the regulatory environment that governs permissible activities of the particular zoning parameters of his village. His land is zoned residential, so firstly setting up his operation required an application approval for industry zoning. He then had to set about the process of getting all of his income-earning activities individually endorsed, including a micro-manufacturing licence, an on-site consumption license and a brewer's license. The pre-start cost for the regulatory approval amounted to a staggering R20 000, well out of reach of all other respondents' interviewed. However, because he has achieved this, Andre was able to jump into a higher potential income bracket. He retails his value-added products directly to the public at top prices. This cancels out transportation expenses. Andre's core products are goats' milk that is turned into artisanal cheese and homemade artisanal beer. His livestock is butchered on site, packed and sold directly to the local community in R50 bags. Spare cash is put into cattle, which gives a 100% return on investment when calves are born.

[26] Interesting to note that many of the families in this area proudly displayed photos on their walls of pictures of white Afrikaans families that they were linked to by blood and name, this leads one to speculate that this might have contributed to their retention of their land during the period of the Group Areas Act.
[27] This is no doubt a huge contributing factor to the extensive difficulties experienced in the research, which was to find successful small-scale farmers.

This section gave a general overview of the farming trends encountered during the field trip and the difficulty in actually identifying successful small-scale farming operations, with the exception of a few successful models.

3.2.3 Research findings

As a general rule, respondents cited the secrets to farming success as follows: to produce a variety of products; to sell goods directly to the public; to barter with other farmers instead of spending cash; to share equipment; to grow one's own inputs; and hard work.

Constraints to farming success cited by respondents included: shortage of irrigation water; shortage of grazing; high transportation costs (the cost of moving produce and livestock); little bargaining power to secure good prices for products (compounded by the lack of village facilities to add value to products such as a slaughter house, dairy and cold rooms); and respondents mentioned that they were duty bound to comply with regulations that stifled entrepreneurial initiatives. These initiatives could be used to generate possible higher income on local markets (the notable exception is Andre Cilliers who changed his regulatory environment).

What about the access to land issue? All of the respondents, except for the Willowmore group, had one commonality: none had been dispossessed of their land during the Apartheid period. The Willowmore respondents were the least successful farmers of all, with only one of those interviewed having a working model. This was a farmer running a Boer goat operation from an RDP-style house[28].

These findings reveal a correlation between historical land ownership and successful farming operations for small-scale farming. Within the scoping region, the Apartheid legacy of bias toward developing and emphasising large-scale commercial farming

[28] This farmer's very small yard was covered in a muddy layer of manure and crowded with goat kids, with the adult goats going out on the commonage during the day. This, the most successful farmer on the Willowmore list, had also benefited from government agricultural support. This case is emblematic of a very poor state of affairs and trying conditions in the Great Karoo desert.

has resulted in a landscape dominated by large-scale commercial farms. This state of affairs in conjunction with the fact that a negligible amount of land is zoned appropriately to facilitate small-scale agrarian activities, means that large-scale farming completely dominates its antithesis, small-scale farming. Two exceptions were identified; they were two villages in the scoping area that fulfilled the criteria of access to farming allotments. These villages are Haarlem and Suurbraak.[29] They are unique in that their white populations were removed following the implementation of the Apartheid Group Areas Act (not the other way round) and that they embody an unusual scenario where homesteads have access to farm land. This leads me to introduce the first determinant:

> *Determinant 1: Surveyed small parcels of available land, available to farm for long duration.*

From here on, I will focus on the village context of Suurbraak, as it is the village where the niche settlement case study is located as well as being a good example of an agri-village.

3.3 The village context: Suurbraak

In Suurbraak, we have a unique village context quite different from the usual Western Cape villages, in that Suurbraak has maintained its agrarian heritage, where the horse-drawn plough and the donkey-cart are still a part of everyday life. Moreover, it has been so for two centuries, since the foundation of the village by the London Missionary Society in 1812 (Datadesk 1996). The local inhabitants have managed to retain their land because of the removal of whites through Apartheid's Group Areas Act and as the London Missionary Society made legal provisions for land allocations for residents (Datadesk 1996).

[29] There are certainly other villages worth exploring in this regard. These villages are linked by the common thread of the Moravian church, the registered owners of these lands up until the 1980's: Elim, Genadendal, Wuppertal, Mamre, Wittewater (Moravian Church of South Africa 2000).

3.3.1 Problematising the rural settlement of Suurbraak

The SDF (2008) for the Swellendam Municipality introduces its discussion of Suurbraak with the following statement:

> Suurbraak is a picturesque rural town with origins as a historical mission station established by the London Missionary Society in 1812. The development of the town's tourism potential, based on its landscape setting and built heritage assets as well as its potential to accommodate small farmer development should take precedence in terms of promoting local economic growth (Swellendam Municipality 2008:131).

This is an encouraging statement, as far as prospective homestead subsistence farmers are concerned. The problem is that the statement is not borne out in the actual zoning and surveying practices of new developments in the village (Swellendam Municipality 2009). The development trajectory is in fact antithetical to supporting the leading quote in the SDF proposal (Swellendam Municipality 2008), as I will explain below. In fact, the only aspect of Suurbraak that reflects "a picturesque rural town" are the old parts, which must be rather credited to the zoning and surveying ethos of the London Missionary Society that surveyed the land into plots large enough for subsistence livelihood strategies (Datadesk 1996). The original plots are 1 000 to 3 000 square metres in size. Subsequent expansion and plot allocations were made for the RDP low-cost housing model type, with plots of significantly less than 500 square metres, so space for these families is limited.

However, importantly development is not confined by space, as misleadingly claimed in the SDF, which states that Suurbraak, surrounded by agricultural land, has no room for expansion (Swellendam Municipality 2008). This distinction is simply misleading as the villagers legally have an equal share in 2755 hectares of prime land adjacent the village (Datadesk 1996). In view of the stipulated 'equal share', what is to prevent this agri-village expanding into this 2755 hectares of land in accordance with the values laid out by the London Missionary surveying precedent of

generous farming allotments. Would this not be more in accord with village heritage? Unfortunately the categorisation, taken for granted in the SDF, pigeonholes the inhabitants into a residential zoning category that immediately negates agricultural activities associated with agrarian homestead pursuits, while at the same time this pigeonholing excludes most villagers from the so-called agricultural entitlement or 'equal share'. What manifests is that only a few can benefit from the collectively-owned communal land[30]. In support of this contention, I reiterate that agricultural land is only available today due to the foresight of the London Missionary Society who ceded the 2755 hectares of land to the inhabitants in 1812. This Suurbraak commonage, for lack of a better description, is held in trust by the municipality but legally belongs to the inhabitants of the town (Datadesk 1996).

Statistics from Stellenbosch University's Datadesk 1996 socio-economic survey highlight some of the human settlement issues.[31] .In 1960, the white inhabitants were relocated as the village was declared a 'Coloured Group Area'. Today, the economically active part of the population, those over 15 years of age, amounts to 52% of the inhabitants, but more than half of these have seasonal employment, which usually only lasts about three to six months of the year. The area was considered poor at the time of the survey, with only 20% of households generating incomes above the 'Minimum Household Existence Level' (MHEL)[32]. Approximately 50% of the houses in Suurbraak have been built with mud/clay bricks and[33] most households have electricity, which is used mostly for lighting; wood is the main energy source for cooking and heating; three quarters of the inhabitants' grocery requirements are bought in Swellendam with a quarter being sourced locally; and

[30] This is an important point unique to Suurbraak, if this land belongs to the village how does one facilitate this equitably, or is the current situation tenable, the land staying in the hands of a few village elites to avoid subdivision and village expansion into larger household allotments?
[31] There have been a few significant changes since the survey: the channel system for irrigation water was replaced by a piped system from an irrigation dam, the average price per square metre of vacant land has gone from R2 to R200 and the RDP-style housing developments have expanded.
[32] At the time of the survey for the Southern Cape, this was R800 per month.
[33] This statistic would have changed as the RDP expansion in cement blocks is now the predominant construction material.

transport is generally by taxi, with only 10% using their own vehicles (Datadesk 1996).

All houses have access to metered municipal water and some have access to cheap irrigation water. However, the expanded RDP developments do not all have access to irrigation water. Approximately half of households have access to farmland, with 40% of households having someone who cultivates the land mostly for vegetables, oats and barley (Datadesk 1996).

Whereas the legislation spells out the development future of Suurbraak as reflected in the SDF, IDP and zoning regulations the strategic priority remains high-density RDP-style housing on tiny plots. This is the underlying strategic objective of the SDF, despite all the flowery words (Swellendam Municipality 2008). The reality is that the majority of people in this rural village live in RDP-type houses with little available land for subsistence farming. This trend is contrary to its heritage value set in place two centuries ago by the London Missionary Society: subsistence smallholdings attached to 2755 hectares of commonage grazing. This national, formula-driven low-cost settlement strategy is therefore the largest contributor to promoting an antithesis to Suurbraak's distinct heritage.

These legislative documents also circumscribe what the majority of inhabitants can and cannot do. For instance, it the zonings as mapped for the area indicate the entire village, including the area for subsistence farming surveyed by the London Missionary Society, as residential (as mentioned later, probably incorrectly). This zoning shackles a large diversity of land use areas into one: all low-cost housing residents, the small-scale farmers and the wealthy weekender landowners must have

their allotted activities prescribed by this zoning category, which they must legally abide by (Swellendam Municipality 2009).[34]

So where in these regulations does a subsistence farmer fit? What potential is there for subsisting off the land, far from an urban area, living on the fringe of a quaint historical village of agrarian heritage and nestled in a unique climatic setting under the rain shadow of the Langeberg Mountain? Where do these self-sufficiency aspirations fit into the broader legislative picture? According to the zoning laws of the 'residential 1 zone', the following activities/buildings are permitted, often with additional consent approval needed:

- Bed and breakfast establishment
- Dwelling-house
- Hothouse
- Limited crèche
- Limited occupational practice
- Second dwelling.

(Swellendam Municipality 2009:47)

These are the only activities and buildings that are legal. For the would-be subsistence farmer, a small loophole can be exploited. S/he could submit in writing to the municipality an application for consent to breed animals. The cost is thereof R3 000 but there are no guarantees the municipality will grant consent, especially as the definition for "breeding establishment" stipulates that the animals are "pets"

[34] Most residents with land and water farm; this is the heritage charm the official documents are referring to. The fact that the same documents render these activities illegal is ironic and, on the whole, ignored by the community.

(Swellendam Municipality 2009:5); this is a rather narrow definition of “breeding establishment”.

The farmer certainly does have his farming options curtailed in the Residential 1 zoning category. Where did these laws come from? How were Suurbraak residents’ agricultural rights, as granted by their two centuries of agricultural heritage, taken away from them?[35] Agriculture is not included in the list of allowed activities, not even as consent use; if it is not mentioned on the list it is not permitted according to zoning regulations. Consent can only be given to items on the consent list. All this is summarised in the quote from the zoning regulations below:

> No land unit falling into a zone shall be used for a purpose other than those uses permitted in terms of this Scheme; provided that where a land unit may be used for a purpose with Council's consent, such land unit may be used for such purpose after Council's consent has been obtained; provided furthermore that any other land use, which is legally approved in terms of the Planning Act or legally exists in terms of this Zoning scheme, may continue to be conducted from such land unit (Swellendam Municipality 2009:36).

What about commonage land use, the surrounding veld and forest land? This land also falls under municipal zoning regulations. This land-use precedent is commonage that is of heritage value to the community and has been entrenched over two centuries. The land is utilised for fuel wood harvesting, communal foraging, harvesting building materials such as sand, wood beams, wattle lathes, as well as collecting medicinal herbs and edible mushrooms. All of this is in line with Forestry policy. According to the South African Ministry of Water Affairs and Forestry’s White Paper (1997):

> The overall goal of Government is to promote a thriving forest sector, utilized to the lasting and sustained benefit of the total community, and developed and managed to protect and to improve the environment (Department of Water Affairs and Forestry 1997:4).

[35] Although these regulations are in draft phase according to the Municipal Planner (Hattingh 2011) they are endorsed and applied by the municipality meaning that Suurbraak residents now need to make a consent application costing R3 000 to apply for permission for agricultural use rights (refer to the section titled laws and regulations in chapter 5 that relates the outcomes of meetings with the head municipal planner).

> Contrary to the traditional view of forestry as the science of managing forested land, forestry today is about the relationships between people and the resources provided by the forest. It includes the use and husbandry of the wood, fruits and other products that come from trees, as well as the wildlife that dwell in the forest (Department of Water Affairs and Forestry 1997:4).

There is no primary use allocation in the zoning regulations that would support the above definition and activities considered. This begs the question of whether the zoning regulations are not contrary to Suurbraak's heritage. The primary uses that are listed under this zone are (Swellendam Municipality 2009:141):

- Biosphere reserve
- Natural environment
- Nature area.

However, forestry is listed as a consent use for this zoning category. Forestry, if defined as per the Forestry White Paper (1997) definition, would then therefore respect this heritage land-use value. Regrettably, this rather inclusive definition is ignored and the document uses the old forestry definition, which is as follows: "Forestry (bosbou) means the extensive planting of trees in veld and mountain areas for commercial purposes" (Swellendam Municipality 2009:14).

The small farmer, who is usually not well educated (Datadesk 1996), is shackled by this incongruous legislation. The extreme complexity of rules and regulations often seem to contradict one another. The communities' right to forest resources is not being addressed in the zoning regulations, zoning and other legislation and arrangements should be better coordinated to achieve this. The extract from the report titled *Participatory Forest Management Policy and Practice in South Africa* (1997) below highlights the injustice of this:

> Forestry Law…The mandate for the government's role in the forest sector is derived from the National Forests Act 1998 (Act 84 of 1998) (NFA) and the

> National Veld and Forest Fire Act, 1998 (Act 101 of 1998) (NV&FFA). This has set out new legislation based on the premise of sustainable forest management.

Under this Act, the Chief Directorate, Forestry is obliged to:

- Address sustainable utilisation and management of state forests;
- Promote economic and social development and utilise the developmental potential of forestry;
- Give the South African people a greater access to the country's state forests;
- Improve equability in the distribution of benefits flowing from state forest resources; and
- Conserve forest biodiversity.

(Department of Water Affairs and Forestry 1997:2)

Earlier, I spoke of a preconception around poor people's unwillingness to farm. From the above analysis, it is apparent that the issue is a little more complex than this. The core issue highlighted is that there are contradictions running through regulatory documents. A result of this is that zoning regulations render many poor residents' livelihood activities illegal, but the value of the zoning rules themselves come into question when they negate policy and definitions stipulated in higher documents such as SDFs. The municipality and other spheres of government should try and co-ordinate zoning schemes and various other laws and regulations, to promote livelihood diversification.

People's willingness or unwillingness to utilise small-scale farming to diversify their livelihoods is negated by zoning rules that outlaw integrated agriculture activities in residential zones. However, people are farming in Suurbraak. They are harvesting forest products for building and fuel. Everyone from municipal officials and planners to the authors of the planning documents themselves consider this part of the unique character of the town. The above arguments justify the second determinant:

Determinant 2: To maximise potential there should not be overly restrictive and costly laws and regulations stifling livelihood activities and market access.

3.3.2 Focus on the village's agricultural practices

Suurbraak is analysed from an agrarian perspective. Suurbraak is a village that still pursues its traditional agrarian heritage. According to a Datadesk 1996 survey, people cultivating land make up 10% of the inhabitants. This figure however only refers to those using their land to cultivate crops, so the percentage is not a true reflection of agricultural activity in the village. For instance, many farmers find it more profitable to graze livestock on their small landholdings and there is 2755 hectares of commonage south of the village as well as land allotments on the north of the Buffeljags River.

I therefore find these agri-statistics a little misleading. I undertook my own survey of agricultural activities around the village centre to add some nuance to the Datadesk data (see the results in table 3). The area I targeted was the old historical part of town on both sides of Suurbraak's main road. These are older homesteads dating back to the founding days of the town, typified by access to both farming allotments and cheap irrigation water. I also surveyed one road behind the main road. These homesteads are typified by farming allotments but with no access to irrigation water. The no-water allotments are a smaller sample of allotments because there are fewer plots of this category that have enough land to farm; plot size is significantly reduced as one moves away from the historical centre of town.

Most dwellings behind the historical centre to the south are RDP-style houses. These inhabitants have little land or irrigation water. This brings the Datadesk data (10% inhabitant cultivators) into proper perspective. If one includes those farming livestock and the majority of people living in RDP-style houses who have no access to farming land, then the 10% cultivators of total village inhabitants may be an accurate statistic. However, it would be a mistake to correlate the Datadesk statistics with 'willingness

(or unwillingness) to farm'. 'Willingness to farm' cannot therefore be inferred from the Datadesk data. For clarity on this issue, I wish to add further details on this 10% cultivators' statistic. The Datadesk data claims that 40% of households have at least one person with access to land. This figure does not indicate whether these inhabitants access to 'available land' includes access to irrigation water or if the land is situated in a location that can be easily monitored from threats such as baboons, roaming livestock etc. (such as a piece of ground near a homestead would facilitate). The key determinants proposed here are therefore: Do farmers have access to cheap irrigation water? Is the relative location of the homestead such that farmers can monitor threats to their farming enterprises? This Datadesk data is of little consequence without pointing out these distinctions. Therefore, gathering data on cultivators as a proportion to those with access to the above requirements would make more sense.

My survey of agrarian activities took place in the summer season of November 2011, the seasonal agricultural peak period of the year. The categories illustrate the various land-use parameters chosen. The category 'no farming activities' is divided into 'inkomers not farming'[36] (New residents, usually holiday houses) and the category 'for sale'. People selling their land are less likely to farm. The agricultural categories were divided into those cultivating only, those grazing livestock only, and those doing both and in some cases other activities such as wood selling. This data only reflects the agricultural activities on both sides of Suurbraak main road. Other farming activities taking place on the north side of the Buffeljags River and on the 2755 hectares of Rietkuil commonage are not included. The survey is therefore not to be understood as reflecting the extent of agricultural activities in Suurbraak but rather as a useful illustration of the willingness to farm, provided three main criteria be in place:

- The homestead is on or near the farming allotment.

[36] A local term used in the village to refer to people who were not born into the village but moved in by buying property.

- The farming allotment is large enough to be considered a smallholding or put to agricultural use (>0.1 hectare) (Fukuoka 2011).
- The farming allotment has access to cheap irrigation water.

Survey results indicate that providing these three criteria are in place, Suurbraak residents resort to agricultural livelihood techniques. The results further indicate that if one of the three main criteria is absent, then this tendency to farm is drastically reduced.

Table 3: Inhabited homesteads with irrigation water and farming allotments

Inhabited homesteads with irrigation water and farming allotments	
Total	114
No farming activities	16
'*Inkomer*' land owners not farming	4
For sale	3
Cultivated land	34
Livestock grazing	27
Multiple agrarian livelihood land usage	28
Other non-agrarian livelihood land usage	2
Inhabited homesteads with no irrigation water and farming allotments	
Total	25
No farming	11
'Incomer' land owners not farming	0
For sale	0

Cultivated land	5
Livestock grazing	4
Multiple agrarian livelihood land usage	2
Other non-agrarian livelihood land usage	3

The Suurbraak survey results indicate that 78% of the allotments sampled that have access to all three criteria choose agricultural activities above others as a livelihood strategy. If we remove *'inkomers'* holiday houses and land that was at the time for sale from the equation, the percentage of homesteads farming increases to 83% of the adjusted sample. Of the farmers farming in the sample for 2011 season, 38% chose to cultivate their land, 30% grazed livestock and 32% used multiple agricultural livelihood strategies.

The second land use group are homesteads with access to farming allotments of slightly smaller size (most are less than 1 000-square metres) but these homesteads must rely on rainfall or expensive municipal water for irrigation. Of this group, only 44% of households are farming their homestead plots. The number of people using their land exclusively for non-agricultural livelihood activities is negligible. This trend subsequently led to the inclusion of these three criteria as determinants.

> *Determinant 3: The homestead is on or near the farming allotment.*
>
> *Determinant 4: The farming allotment is large enough to be considered a smallholding or put to agricultural use (<0.1 hectare).*
>
> *Determinant 5: The farming allotment has access to cheap irrigation water.*

According to the Datadesk (1996), the majority of cultivators in Suurbraak plough their land with horses while a quarter use hoes, spades and forks. Home gardens are used to cultivate mostly vegetables and fruit for home consumption. Very few people grow fodder for livestock (Datadesk 1996).

What could the reason for the deviance from the small-scale farming methods gleaned from the research road trip be? I would attribute this to the following local factors: firstly, landholdings are considerably less than 1 000-square metres so the propensity to set land aside to grow fodder is less, the larger landholding in Suurbraak only being 3 000 square metres in extent making bailing of hay on these allotments impractical. Secondly, Suurbraak is a relatively high rainfall area with good access to rainfed commonage grazing.

These considerations around determinant 5 would then be indicative of another determinant pertaining to reliable access to inputs (determinant 6):

Determinant 6: Access to inputs (commonage and/or bought in).

What about markets? Are people making a living off these small pieces of land and is it a viable course of action for the younger generation? According to the Datadesk survey (1996), the majority of cultivators sell produce directly from their homes to other local residents and occasionally to people passing through town, with only 10% selling to middlemen or shops. Cultivators who don't sell to middlemen or shops claim that they can only produce enough for their own subsistence requirements (Datadesk 1996). Approximately 90% of cultivators in Suurbraak consider their farming operation a success. Half of these claim it generates sufficient income and a quarter of respondents claimed they produce enough for family subsistence (Datadesk 1996).

Datadesk survey results indicate the majority of cultivators are older than 50 years (Datadesk 1996). Will their children take up their parents' hoes and maintain their parents' agrarian heritage?

To discover the answers to these questions would be a means to sustain the village agrarian heritage. The most important task therefore must be firstly to pinpoint possible determinants and then test these via an actual case study situated on a

piece of ground in the actual village context. I believe that in order to guarantee the success of these heritage-farming practices, the six determinant factors earmarked above should necessarily apply. Over and above this, farming needs to be considered a viable livelihood approach by the community itself. In other words, can their produce be competitively priced against that sourced from commercial farms? Put differently, what is the opportunity cost of farming for self-sufficiency? It can be argued that for the individual, a wage job on a commercial farm would constitute an alternative, but is this true for a household or in a context where most wage employment is temporary and seasonal? At the time of the Datadesk survey, 60% of land cultivators were unemployed (Datadesk 1996). The 1996 Datadesk statistics were compiled at a time of relative prosperity; what is the unemployment rate today, in a financial crisis? A large percentage of cultivators however do have jobs or other sources of income (Datadesk 1996). It seems therefore that cultivating land is not mutually exclusive to generating other forms of income as well. I believe, on the strength of the Datadesk evidence, it is safe to make the assertion that agrarian livelihood pursuits are not necessarily the opportunity cost of having a job, although this can be disputed. Certainly, this cannot be disputed if the point of reference becomes the household rather than the individual. The overwhelming majority of households have to carry a burden of unemployed members anyway (Datadesk 1996). These are family members who cannot generate an income but who none-the-less need to be fed; this is a cost to the household. Could this otherwise idle labour not be used to put food on the table, to raise a pig for the piggybank? The question then becomes whether the opportunity cost of a job does not rather translate into reduced labour for the homestead. The survey indicates that the majority of temporary workers assist with the household when not employed (Datadesk 1996). To the six determinants cited above, we can therefore add a seventh pertaining to manual labour and financial income.

Determinant 7: A source of manual labour and financial income.

A picture has now emerged of a unique and successful farming community where a healthy proportion of inhabitants have access to the hypothesised determinants, listed above.

These original historic homesteads of the Suurbraak community thus represent a valuable antithesis to the RDP-style low cost settlement developmental regime dominating the rest of Suurbraak and for that matter, most the rural villages of the Cape region.

This Suurbraak community embodies this antithesis carrying forth its agrarian traditions (simple subsistence, horse-drawn ploughs, donkey carts, selling locally, eating locally, etc.) into a modern era where the dominant agrarian *status quo* is high technology, petro-chemical-based farming servicing centralised global distribution networks.

Is it sustainable? The next section considers the case study, giving a multifaceted overview of the sustainability theory as initially applied to the case study.

3.4 Implementing the theory on the land

Section 3 introduces the implementation of the theory (referenced in the literature review on the case study), at the outset of the project. What we started with was an open plot (clean slate) facilitated by the determinants elicited in section 1 and 2 above:

The case study is facilitated by all these determinants except for determinate 2: to maximise potential there should not be restrictive and costly laws and regulations stifling activities and market access, as we were unaware at the time that

municipality was enforcing a Residential 1 zoning[37]. This meant that our integrated farming vision was illegal and determinant 3 (A homestead on or near the farming allotment) was hastily facilitated by quickly erecting a temporary dwelling on site in the form of a loglap bungalow.

Essentially, we began the move towards self-sufficiency from scratch, armed with certain theory and principles that we were going to attempt to live by.

3.4.1 The alternative niche settlement system conceived and implemented theoretically

Before developing the open plot, we needed to take care of basic living requirements, as no municipal services were available. Therefore, autonomy needed to be achieved on-site in a long-term sustainable way for us, as well as for our ecosystem. The priorities at the time were to fence off the property and to set-up a temporary dwelling. We put up a Veldspan fence backed by a thorny hedge of useful species of creepers and shrubs[38] and we planted blackberries, num nums, coral trees and *acacias*. A simple dwelling cabin was required to live in during the development phase of the project. We erected a 3x9-metre loglap bungalow, serviced by a composting toilet, rain water harvesting and grey water harvesting, solar power, and an oven constructed from clay. It can be argued that living in a 3x9-metre uninsulated loglap cabin is not most people's idea of a high standard of living. This could be the reason why most shack dwellers would prefer cement housing. Our own vision for a home, however, was not a cement structure, as this would not harmonise with our environment, nor did cement square with our intentions to build a house using locally-available and organic materials. At any rate, our understanding of

[37] Through the process of engaging with the municipality it was much later discovered not to be the case, what was in actual fact the zoning would be stipulated by Land Use Planning Ordinance 15 of 1985 (Grobler 1997), see correspondence with municipality appendix 4.
[38] The common names of tree species are used throughout unless reference is being made to the genus name (italics), which would then indicate various species of that genus.

home was more than a simple shelter. Therefore, a 3x9-metre loglap cabin was fine as an interim measure, so long as our broader vision remained intact.

This broader vision fell under the following four headings.

1. An owner-built house using local materials;
2. Producing one's own organic food and beverages and managing personal primary health with the use of medicinal plants;
3. Harvesting one's own energy and water; and
4. Managing one's own waste.

These constituted the four pillars of the symbiotic system we have endeavoured to develop and experiment with over the four years of research. Each pillar is presented and discussed in detail. Appendix 8 includes photos illustrating the site.

3.4.2 An owner-built house using local materials

Local materials available and construction techniques

Various traditional organic building techniques were researched and I had some experience making adobe bricks from working on a project in the Cederberg Mountains with agents who had imported the first adobe brick-making machine into the Western Cape. This experience, combined with research and my understanding of the locally-available building materials, convinced us that clay was our preferred building material. By 'clay', I mean cob and not adobe. The key distinction between the two is that cob consists of mixing clay, sand and straw in a homogenous texture that is applied directly on the structure; adobe structures on the other hand are built from clay bricks that are previously sun dried (Evans, Smith & Smiley 2002). These building techniques, although they use the same materials, are thus very different.

My understanding at the time was that adobe was a tedious way of achieving the same result, a mud house.[39]

Other locally-available building materials were rock, river sand, pine, wattle, blue gum, Blackwood and straw. Therefore, a wattle and daub or straw bale structure would have also been possibilities. The wattle and daub idea was discarded, as I was uncertain about how the wattle would stand the test of time. The straw bale idea was discarded, as my interpretation of the method was that the speed of construction was negated by the need for technical precision in engineering a solid construction using this technique. This building method also requires strict adherence to an original plan with little scope for creative alterations.

Site selection and orientation

Conceptualising an open plot is important in that whatever is built and planted determines the position of everything else. This is especially true on a small piece of ground. It was therefore important from the beginning that we did not corner ourselves. A misplaced temporary dwelling or animal barn could get in the way of future development plans. It is important to realise that if one is sure one's site design is right for today it is not necessarily the same site you would choose in some distant future when your needs will most certainly have changed. This does not suggest comprehensively designing the entire plot from the beginning, but rather the opposite: playing different scenarios through one's mind and then basing one's site selection on a design that makes allowance for the greatest number of imagined scenarios (Evans, Smith & Smiley 2002).

A drawing is very useful as it allows one to orientate oneself and to plan accordingly. Aspects to consider include all life that will inhabit the plot, seasons, diurnal changes

[39] This is actually an example of a determinate negation stemming from the earlier experience of building and producing adobe bricks in the Cederberg, It appears, however, under the theoretical section, because this experience occurred before the research period and therefore informed the direction of my theoretical research. Without this experience, I might have built an adobe house.

in temperature and sunlight, prevailing winds and sources of noise pollution (Evans, Smith & Smiley 2002). Builders new to the area might not even know where north is. As builder and conceiver of all development, it is important that all this local knowledge be absorbed, that it becomes second nature and is factored into all designs. This is where little sketches that credit all these factors come in handy, particularly as they then become part of one's consciousness in the form of symbols that become portals for additional ideas.

All this implies living for at least half a year on-site before construction commences. A neighbour who rushed in, designed and built a conventional house in three months, spent her entire savings on building the house, only to discover that in winter her only sunlight was at the back of her house, where she had no windows, doors or recreational space. She will use a lot of heating fuel to compensate for her haste.

A detailed biophysical description of the site appears in the section on food production.

Building plans and building regulations

I was extremely concerned about getting the building plans for an unconventional house passed by the local authorities. For this reason, I commissioned the most well-known, local, conventional draftsman to draw our plans. We commissioned the draftsman, who seemed interested in what we were doing, and interpreted all of our needs in his own conventional draftsman language. After communicating that he understood exactly what we needed, he was left to draw up our house.[40]

This is not a process I necessarily agree with. A stranger comes onto the site, chats with the owner-builder for half an hour, then goes to the drawing board, and dictates your future house. A determinant insight gleaned while digging foundations in the

[40] This section speaks of determinate experience of dealing with the draftsman. This constitutes a slight overlap between theory and practice, but this discussion was included into this chapter as building plans are essentially a theoretical representation of the project.

Cederberg fuelled my suspicions that the draftsman had not fully grasped my ideas but was simply interpreting them through his own conventional experiential lens. This led me to reflect on the rift between the designer of a dwelling and the builder of the same dwelling. The draftsman conjures the building in his imagination and then manifests it hypothetically on paper. The builder on the other hand must slog away day after day for minimum financial reward. The builder doesn't conjure, he constructs. The worker is on site eight hours a day. S/he goes to sleep with the actual (not theoretical) building site imprinted on her or his brain. S/he is intimate with all the technical challenge of the design in three dimensions. These challenges arise with the sun in real time and are confronted through a methodical process of building.

When I eventually looked at the plans, the house looked exactly like the conventional dwellings that characterise the Swellendam district. I was surprised as the rough drawing I had given the draftsman was everything but conventional. However, he explained to me that the computer system used for drafting was not proficient at drafting irregular structures. The point was however to get plans passed, and as an owner-builder I didn't need plans to dictate the house I wanted to build. These plans, destined for the authorities, therefore became an abstraction for me and I submitted them. They were passed without any problems.[41]

Cooling and heating

In winter, one prefers a warm house, while in summer, a cold house is preferred. The key to resolving the dilemma is the aspect of the sun (Evans, Smith & Smiley 2002). The summer sun passes directly overhead, so roof insulation and ventilation need to be optimum. From the outset, we researched different options for our roof, ranging from putting up a growing roof, a thatch roof, or a corrugated iron roof. We decided the latter was optimal for harvesting water; however, insulation was a problem. We

[41] For building plans to be passed in areas with no municipal services, the regulations stipulate that a conservancy tank must be included in the drawing. We compromised our recycle nutrients philosophy on paper by adding this conservancy tank in the drawing. We have yet to build a conservancy tank.

did not conclusively solve this problem at the time but thought we would use sheep's wool pressed between roof and bamboo lathes (thin wooden poles). Sheep wool constitutes a very cost-effective, locally appropriate and easy way to insulate a dwelling from the African sun. In winter, the sunlight angle is directed to the walls, windows and doors as well as the roof. Thick cob walls heat up very slowly, then retain the heat, so walls on the sunny side are expansive and percolate heat into the dwelling for much of the cold winter's nights (Evans, Smith & Smiley 2002, Pearson 2000).

The house was designed to have a cold room for purposes of storing cheeses, cooling brewed vats of beer and keeping preserves. Incorporated into the design was a cavity wall through which water percolates into a central fountain. This cavity wall is designed to bring cold air from the foundation drainage area. Air from the riverine area nearby is generally ten degrees colder than other areas. The air is sucked from this area through the underground foundation pipe - and due to the temperature differential between house and river - passes underground through the drainage pipe bedded in moist gravel and clay and is insulated by two metres of mortar bond beam stem wall and cob wall; the air then cools further. Then it passes into the house through a water-cooled central cavity wall and comes into the pantry as cool energy-efficient air-conditioning, evacuating the warmer air from the cold room through roof height vents.

This small house was designed so that we would need to make minimal purchases other than: bagged lime, negligible amounts of cement (for the foundations), builder's sand (crusher dust), straw, machined 50x70 mm pine beams, and corrugated iron sheets. The material cost associated with purchasing these external inputs is less than a third of the cost of a conventional house. A conventional house built on the same budget would not get higher than floor level before funds would be depleted.

3.4.3 Producing one's own organic food and beverage and managing personal primary health with use of medicinal plants

The theoretical underpinning for the design of the smallholding were strongly influenced by principles of permaculture (Mollison 1991), as well as literature on integrated farming methods, which emphasises recycling of nutrients between the kingdoms of nature (Coats 1996, Coats 2000, Rosenberg & Linders 2004, Pauli 2010, Lightfoot & Noble in Devlin & Zettel 1999). Original diagrams of the permaculture zones appear in appendix 8.

The land is situated on the eastern wet side of the Langeberg mountain range straddling both winter and summer rainfall areas. Rainfall is a year-round average of 50mm per month. The site is characterised by rich peat-like topsoil with natural grass cover, clay soil areas delineated by *Rhus* pioneer shrubs and bracken soils adjacent to a river. There is a stand of indigenous trees along a drainage line, cape beach, tree fuchsia, wild olive and stinkwood. The overall conditions are dry due to intense summer heat. The conditions are conducive to propagation of invasive exotic trees, predominantly black wattle.

The aim was to produce fresh, healthy, organic and ethical food to replace the food of doubtful origin we bought at supermarkets. A polyculture system design for a small piece of ground is focused on small livestock and vegetables (Mollison 1991). The aim was to produce a diversity of products to bring to the kitchen straight from the garden and avoid (as far as possible) buying in fresh produce. The system is envisaged to produce organic vegetables, eggs, rabbit meat, duck meat, milk, cheese, beer (grain is a bought input with homegrown hops), fruit and nuts.

Overall farming design

The most fundamental issue in overall plot design is the soils. The soils ultimately defined even the position of the main dwelling (the main dwelling sited in the centre of the drawing was not built at the time this farming plan was compiled. Refer to appendix 7: diagram of permaculture zones.

The best soils are farmed in such a way that they retain the moist lively state conducive to life. This means that soils must not be exposed to excessive heat and dry winds, as these render good soils unviable. So the aim is to balance the sunlight needs of the soils with those of beneficial trees bearing in mind that excessive shade is not conducive to growing vegetables either (Mollison 1991).

This is borne out in the design by the planting of large trees on the southern border: a truism for all southern hemisphere people who revere the winter solar light. In this way, we intended to manipulate the amount of sunlight exposure on the land. The northern and western borders are necessarily planted with hedgerows to protect crops from the prevailing *berg* [mountain] winds that can gust in storm force velocity from the northeast and easterly directions and in one day could wipe out an unprotected food garden. These hedgerows also offer protection from frost, which tends to come with the cold, subsiding mountain air from the north. These interventions transform the soils and growth parameters of the land. New niches conducive to growing food crops are created (Mollison 1991). Niche creation is essentially understanding the needs of your crop and designing your system around this (Mollison 1991). The farm design follows the permaculture principle of having different control zones (Mollison 1991).

The zone I area is where our most sensitive crops are grown (see annexure 7.1 for picture of the site and permaculture zones). The soils in this area were the determinate variable for the special design of the whole project, site selection for

everything else was determined by this. The best soil area on the plot was set aside for growing fragile food crops. It was hedged off to become our zone one vegetable garden.

Our zone II area was set aside for hardier crops that would survive not being irrigated continuously. Much of our vegetable production will happen here with certain overlaps with the zone one earmarked for crops, for rotational purposes. Vegetables, but also berries, are grown here. The southern area of the plot is a zone two area for composting and stabling.

The zone III areas double as an orchard and a foraging area for livestock. The “tree stacking method” (Mollison 1991:153) is employed. Fig, macadamia, almond, prune, pomegranate and oranges are chosen because of both their proven success in the area and personal preference.

Zone IV, on the eastern and southern sides, is planted to connect the on-site tree plantation with that of the river wetland below. Species planted, such as yellowwoods, stinkwood, willows and camphor, will help retain the riverbank during periodic flooding. Livestock forage in this area and wood can be harvested. For instance, wattle can be left to grow as a pioneer species, helping to shade more sensitive trees (Fukuoka 2011). Once established, the wattle can be harvested for firewood. Greywater can be used to grow roofing and fencing bamboo in this area. Another zone four area that is used for grazing is 10 000-square metres of communal grazing land. Because of its proximity to the plot, it is ideal for livestock foraging.

Zone V is a recreational area set aside for domestic use but animals also forage in this area, making it the nodal meeting point of the indigenous, the human and the domesticated.

Because the smallholding needed to produce more than just food, part of the design was to incorporate as many plants as possible with medicinal value. This involved

firstly researching the medicinal value of existing species found naturally on site and introducing species required for our personal health needs and general healing. Refer to appendix 1: Utility trees on 1 000-square metre plot that shows all tree species planted or used. This table was created for an assignment compiled at the outset of the project; it gives an idea of the complexity and value that can be generated through researching utility plants even on a small piece of ground.

Farming systems

The whole farming system was designed to be managed by one person with a wheelbarrow, a spade, a fork and a hosepipe sprinkler. Much of the work is done by nature itself. A "Bio-Resource Flow Model" based on the "Farming Systems Approach" as cited in by Lightfoot and Noble (in Devlin & Zettel (eds.) 1999:212) indicates this. As one can see from the original design (Refer appendix 7: Bio-resource flow model), a very simple microcosm was created around the original cabin. This involved a simple domestic life based on biomass and solar energy, cooking outdoors and living in harmony with nature by harvesting nature's produce and recycling waste back into the land so that all bought inputs, both domestic and agricultural, effectively enhance the mineral wealth of the entire ecosystem. Inputs to the system then, through bio-resource flow design and creativity, aimed at creating multiple production capacity. For instance, grain bought into the system creates more value if it brews beer before being used as animal feed. It can be argued that it has less nutritional value, which is correct, but if it undergoes processing by another kingdom of nature prior to being fed to the animal kingdom, then it regains nutritional value (Pauli 2010). In this way spent beer grain that exits the brewing chain as a sterilised substrate can be used by the bacterial kingdom to make *"bokashi"*[42] feed (Rosenberg & Linders 2004:79), or by the fungal kingdom before becoming animal feed (Pauli 2010).

[42] Similar to silage but using grain and effective micro-organisms.

The key inputs to the system: feed grains, straw, malted barley, sawdust, domestic consumables and irrigation water are combined to produce mineral wealth. Discarded straw from goat feed becomes barn litter. Barn litter soiled with manure becomes compost that in turn recycles back into the homestead as organic produce. Human kitchen waste is used in earthworm farming that produces: worm pee - a protein-rich tonic for chickens and ducks - and high quality vermicompost; thus, the cycle is closed as a positive feedback loop. Human excrement is composted naturally with sawdust, which is a free input. The sawdust manure combination is the ideal nitrogen carbon ratio for compost (Jenkins 1999). Conventionally-minded people have an aversion to human excrement thinking it a dangerous pathogenic material, but there is not much rationality behind this misconception (Jenkins 1999). Human waste can be rendered safe and is no different from composting any other manure as the thermophilic composting period kills the pathogens (Jenkins 1999). Human manure processed properly is an excellent compost material. We employed a precautionary approach as regards “humanure” (Jenkins 1999). People with modern lifestyles contain in their bodies and in their excrement a small percentage of toxic heavy metals, especially people who eat many processed foods (Jenkins 1999). For this reason we decided to use our humanure compost to grow woody biomass for fencing and roofing purposes rather than to produce food but this is probably an unnecessary precaution and human manure has been successfully been used as compost for centuries in Japan (Fukuoka 2011).

The discussion on food production ties in strongly with the discussion on waste management (see below), but it is important to include this here as through waste one creates nutrients essential for soil health and therefore crop production, most importantly it clearly illustrates the concept of ‘metabolic unification’.

The farming system is guided by key principles:

- Decomposition precedes new life (Coats 1996, Rosenberg & Linders 2004, Devlin & Zettel 1999, Stamets 2000, Fukuoka 2008, Mollison 1991, Jenkins 1999, Pauli 2010).
- High functional diversity of species (Devlin & Zettel 1999) creates resilience and a stronger capacity of adjustment, capacity and multi-functional productivity (Devlin & Zettel 1999, Fukuoka 2008, Mollison 1991, Jenkins 1999, Pauli 2010).
- Waste from one system is food for another kingdom of nature. In this way waste becomes an agricultural input with a positive feedback loop into the overall system (Coats 1996, Rosenberg & Linders 2004, Devlin & Zettel 1999, Stamets 2000, Fukuoka 2008, Mollison 1991, Jenkins 1999, Pauli 2010).
- Adopting the no-till method enabled us to avoid any damage to soil life and exposure of soils to sunlight (Fukuoka 2008, Mollison 1991).
- Farming with weeds doubles as production of mulch and animal feed (Fukuoka 2008).
- Applying heavy mulching on beds creates a cool and moist habitat conducive to bacteria and insect reproduction (Coats 1996, Rosenberg & Linders 2004, Devlin & Zettel 1999, Stamets 2000, Fukuoka 2008, Mollison 1991, Pauli 2010).
- Farming among the trees to create the correct shade/sunlight balance, to control soil temperature, create frost breaks, bring up deep level nutrients through leaf litter and enable nitrogen fixing (leguminous) (Coats 1996, Rosenberg & Linders 2004, Devlin & Zettel 1999, Fukuoka 2008, Mollison 1991, Jenkins 1999).
- Excluding the use of any herbicide, poisons or chemical fertilisers (Coats 1996, Rosenberg & Linders 2004, Fukuoka 2008, Mollison 1991).
- Providing the maximum care and freedom for livestock, combined with access to fresh foraging (Fukuoka 2008, Mollison 1991).

- Practising on-site slaughter, with minimum stress during slaughter, in reverence for the ending of a symbiotic relationship.

3.4.4 Harvesting one's own water and energy

Basic water harvesting without boreholes and pumps entails landscaping, that is to say modifying the topography of a given site. This is often necessary if the area is prone to flooding and so building water-catchment ponds and earth swales to redirect and capture flowing water over the plot (Mollison 1991) and installing roof water catchment gutters and tanks and overflow catchment areas is necessary. Basic energy harvesting required building a wood oven and wood storage and chopping areas and installing a solar 12-volt system with a battery or battery bank.

Water harvesting

The swales break up and redirect the flow of floodwater over the plot. Before creating the swales, water flowed unhindered across the plot towards the river on the eastern side. The swales allow us to manage excess water and store some of it on site for our own benefit (Mollison 1991).

The stand of trees on the eastern border are local varieties (stinkwood, Cape beach, criss-cross turkey berry, tree fuchsia, wild olive) indicating a natural drainage line and possibly an underground spring. The stand on the southern border harbours pioneer species trees (*rhus* species, bushtickberry, pioneer spikethorn) that have grown on a seepage border as the topsoil thins out and the clay soils emerge on the surface.

The initial dwelling was a 3x9 meter log lap cabin with a tin roof. To this was attached a 500-litre water tank raised to the height where the outlet valve was over a sink on a wooden stilt platform. With this system, we had access to clean water on tap. This capacity was deemed appropriate due to the following factors: reliable year-round rainfall patterns and the fact that we had access to irrigation water. We therefore

anticipated the rain to be sufficient to cover all our domestic needs except for showering. For this, we would use the irrigation water. Without irrigation water, this 500-litre system would not be adequate, as periods of low rainfall require the highest irrigation. A lot of clean rainwater is indispensable for the cleaning and bottling processes that are part of brewing beer and making cheese.

Energy generation

Most cooking and baking can be done on a fire. A clay pizza oven was built to serve the purpose of cooking and baking. There is abundant firewood in the form of black wattle, pine, blue gum and driftwood. Beer was brewed on a purpose-built fireplace with a 20-litre pot. However, because of intense summer heat, some form of cellar was required to store the maturing beer vats. This could be a hole in the ground or a well-insulated chamber on the south side of the cabin. LPG gas is used as backup heating fuel but is not essential.

In the cabin, we installed a basic single 12-volt battery solar system. The panel trickle charged the battery so that we had some light in the kitchen and a reading light at night. We also relied on the system to run a laptop computer and charge a cordless drill. Car batteries can be connected and kept charged. A basic alarm system was also connected. For refrigeration, we employed an evaporative cooling system of two clay pots, with the smaller pot placed inside the larger. Water was then inserted between the pots to form a water jacket and the pots covered with a wet cloth. This traditional cooling system is sufficient to keep butter firm in the hot months.

3.4.5 Managing one's own waste

We designed a system consisting of composting our sewage, recycling our grey water and reducing and reusing most of our solid waste.

Human manure

Researching alternative waste management systems I came across Jenkins' "humanure" (1999) concept but immediately discarded his bucket system as a little too organic for my liking. I must credit Hendrik Mentz, my father, who experimentally adopted Jenkin's system before me and convinced me of the system's merits by installing one in the otherwise exclusive suburb of Higgo Vale (Cape Town). Concisely, the system works despite people's inbred aversion to human excrement. The person uses the toilet and the excrement falls into a normal plastic bucket. Sawdust is immediately used to hide the excrement. This achieves two things; firstly, the matter thus contained cuts the smell that would otherwise attract flies, secondly nitrogen-rich excrement is complemented with more or less the correct carbon ration (the sawdust) for optimum composting. When the bucket is full, the humanure is thrown onto a compost pile and recovered in sawdust. A fruit-packing crate is a suggested humanure receptacle (Jenkins 1999). Jenkins claims that after a year the material is safe to use as compost in your garden (safe from pathogens and worms. In fact, Jenkins used to grow his own vegetables using humanure. Photographs in his 1999 book, *The Humanure Handbook,* indicate an extremely lush vegetable garden and healthy looking family, which bare testimony to this. He points out to those with a conditioned aversion to humanure, that two years is an absolute guarantee of the material's safety from pathogens (Jenkins 1999). Jenkins is not an academic scientist in the formal sense of the word but his expertise on the subject stems from employing science to test his humanure for safety as well as decades of dialectic between him, his family and their humanure system. The system is almost frighteningly simple and is therefore the cheapest way to process human waste safely. My chief concerns while testing the system were leaching into underground water, vermin and flies. For the most part, I followed Jenkins' recommendations except that I placed my compost piles in chicken wire enclosures on mortar evaporation platforms.

Grey water

For our grey water waste, the aim was to keep all pollutants out the topsoil. Banned from the home were all non-biodegradable detergents and anything containing chemicals. Grey water was routed through a vermiculite and straw filter and fed into the well where it would be naturally filtered by clay directly into the underground water table. From time to time, the system would be emptied and the impurities cleaned out. I conceived the design with reference to Horn (undated b) and Mollison (1991).

Solid waste

By producing most of our needs at home, we would keep solid waste to a minimum. For instance bottles can be recycled for beer brewing; jars for preserves; packets for keeping salads fresh; plastic containers for storing meat, dairy and leftovers or for potting seedlings. Before disposable packaging leaves the homestead as trash it should ideally be reused a number of times, and be in a partly-degraded state when finally discarded. The small amount of trash produced is taken by hand and deposited in a municipal public dustbin, as there are no recycling facilities in the village or municipal area.

3.5 Concluding remarks

This section has given the theoretical and practical background that formed the basis for the case study at the outset of the project. The fundamental aspect of conceiving the niche context livelihood approach is that it is an attempt to strive for metabolic unification; everything is connected and is rerouted to incorporate the participation of eco-system services in such a way that it provides for human needs and wants. We directed our energy at generating self-sufficiency: bread, meat, dairy, fresh greens, beer, water are harvested or produced: grains must be bought in but yeasts can be

cultured: hops are grown, meats can be salted and dried; fruit can be dried; and greens can be bottled as preserves.

Setting up this quality of livelihood requires minimal investment (other than paying for the land). In the model proposed there was initially some fencing required as well as a 3x9-metre wooden cabin, a battery and solar panel, and basic gardening and building implements. This is a relatively small investment, (in terms of setting up a self-sufficient operation) when one considers that niche settlement creates work in the form of the labour involved with an owner built house, and it facilitates the on-site production of food which is high-quality, relatively organic[43] and free range. This substitution of quality food is equivalent to food retailed at exclusive stores at high prices usually accessible only to wealthy people. Can its production be achieved at minimal cost on a small piece of ground, can its quality maintain health and wellbeing and can surpluses be value added to generate income for the home? Is it possible to de-link from expensive municipal services by harvesting water, sunlight and biomass? Is it possible to manage most of one's own waste on site with minimal negative environmental impacts? If these are valid themes, then does it not constitute a pressing area of research?

The next chapter documents the process of testing and improving the implemented theory using the Hegelian approach of determinate negation.

[43] At the outset, we had not anticipated how difficult it would be to source organic input grains for the farming operation.

CHAPTER FOUR: Applying the determinants in a specific context

4.1 Introduction

Our vision of a sustainable off-grid rural niche context to embody a comprehensive antithesis to the on-grid RDP-type municipal projects springing up at the circumferences of many South African rural towns was constituted by the following key focus areas (theoretically introduced in chapter three):

- Building our own house using local materials;
- Producing our own organic food and beverage and managing personal primary health with the use of medicinal plants;
- Harvesting our own energy and water; and
- Managing our own waste.

In chapter three, I described how I conducted a field trip in order to test the extent to which aspects of the above vision underpinned successful small-scale farming operations. The seven key determinants for a successful small-scale farming operation flowed from my observations and the small farmer interviews that I conducted:

In this chapter, I attempt to look critically at our own project through a Hegelian lens, applied systematically to each of the aforementioned four self-sufficiency focus areas, using Hegel's "determinate negation" method, described in chapter two and here presented as a qualitative narrative (see figure 2 in chapter 2). Each focus area is divided into its primary components and addressed under the following headings: Title, Theoretical aim and philosophy, Theoretical process, Theoretical problem statements identified, Theoretical theses, Practical implementation, Testing and

problem identification and determinate negation of original theses, Practical determinate truths (new theses or anti-theses or syntheses), and Key determinant confirmed, whereby:

- **Title** refers to a particular aspect of our vision.
- **Theoretical aim and philosophy** explains how I tackled the above aspect of our vision, and why.
- **Theoretical process** refers to how the theory was incubated.
- **Theoretical problem statements identified** lists all the problems I foresaw, with respect to the above.
- **Theoretical theses** explains how I deliberated over, thought about or 'got my head around' each of the above problems.
- **Practical implementation, testing and problem identification** is a 'hands-on' description of how the above problems were tackled.
- **Determinate negation of original theses** describes what was discovered while tackling the problems.
- **Practical determinate truths (new theses or anti-theses or syntheses)** shares what I learnt from the process.
- **Key determinant confirmed** states whether my intervention(s) successfully aligned with our vision.

The above headings - that need to be understood within the context of the Hegelian method of determinant negation discussed in 2.3 - helped me get to grips, stay connected, understand and articulate every single aspect of what we initiated as we gave shape to our vision of embodying the antithesis to the status quo by trying to live sustainably off-grid.

4.2 An owner-built house using local materials

Before finalising the design of the house, we began by tentatively unearthing the proposed building site, which we cleared and started excavating by hand. We still hadn't decided exactly how the house would be shaped or even what size it would be. We noted the substrata soils, which we were careful not to disturb as we realised this renders the base for the foundations structurally inferior. This sensitivity is not possible with a mechanical excavator. I kept digging away in loamy soil at the bank until I reached a fine black humus-like soil that then determined my building limit, as I had no intention of disturbing good agricultural soils.

The soil quality, combined with our wish to keep an existing stand of trees intact, therefore defined the shape of the house. By removing the soft topsoil to firm clay and loam subsoil, we more or less 'designed' our floor space and rooms around the different levels of excavated space. The floor level hovered throughout the construction phase and was the last feature set in mortar.

The topics covered in this section pertain to the use of local materials, the reliance on industrial products and the use of mechanical equipment.

4.2.1 Using local materials, is it viable?

Theoretical aim and philosophy

The aim was to build a house using locally-available organic materials that naturally complemented the environment and were non-harmful, insulated and liveable.

Theoretical process

This theoretical process spanned many years spent studying natural building books and site visits.

Theoretical problem statements identified

- Organic materials are not as strong and resilient as industrial equivalents.
- There is no clay available on site for cobbing.
- River sand is available but harvest can damage rivers.
- One should use cement in foundations and stem walls because they need to be waterproof and strong (Evans, Smith & Smiley 2002).
- Untreated wood decomposes and is attacked by beetle.
- Mud structures need to be protected from the rain, especially when the walls are high and exposed (Evans, Smith & Smiley 2002).
- Organic insulation materials such as sheep wool can attract pests (Evans, Smith & Smiley 2002), but treatment renders the material toxic.

Theoretical theses

- Cob walls are probably not as strong as conventional walls, but, built wide, cob is sufficient to be load bearing (Evans, Smith & Smiley 2002).
- Clay could be harvested in the mountains where springs appear on the surface as this often indicates a clay layer below (Evans, Smith & Smiley 2002).
- River sand can be harvested close by, the best place being on inside bends where the sand naturally deposits making it a more renewable source than mining sand from the outer river banks (Evans, Smith & Smiley 2002).
- It is necessary to use cement mortar and plastic in foundations as they make foundations waterproof (South African Bureau of Standards 1990).
- Harvested wood left in a river for two months and treated with environmentally-friendly varnish, will be protected (Evans, Smith & Smiley 2002).
- A temporary roof can be constructed on temporary poles to serve as protection of cob from the elements (Evans, Smith & Smiley 2002).

- Organic insulation such as sheep's wool can attract pests, but if you leave it in a fast flowing stream, you can wash out the lanolin, which is the element that attracts pests (Evans, Smith & Smiley 2002).

Practical implementation, testing and problem identification

I designed, commissioned and had plans passed for an owner-built cob house. I excavated the site by hand with spade, pick and wheelbarrow, marked the foundations out in lime powder and started digging the foundations by hand. I unearthed spring drainage lines, which gave me insight into site drainage. I separated a top layer of loamy soil under which I discovered 100% clay ideal for cobbing. I constructed test bricks (Evans, Smith & Smiley 2002) using in turn: river sand, builder's sand and crusher dust. The latter bricks were determined superior. This convinced me to truck in crusher dust to site rather than disturb the riverbanks by harvesting sand. I constructed lime mortar bond beams above gravel drainage as stepped foundations with a stone and mortar stem wall (Evans, Smith & Smiley 2002).

Walls were made from cob and floors from lime mortar. Beams and laths were harvested using handsaws from a nearby blue gum forest and dragged to the site with an old Mercedes Benz sedan. For roof insulation we used 'straw clay' (Evans, Smith & Smiley 2002:245) on *laths*, and the roof was constructed from corrugated iron. The process for a cheap insulated roof comprised blue gum beams at half metre intervals covered with blue gum *laths* bedded into the cob and covered with hessian. On this were roof anchor points comprised of 50x70mm pine beams lashed with wire to the blue gum beams. The spaces between the roof anchor beams were filled with an insulating material of light clay straw. A corrugated iron roof was screwed onto the beams.

The pile of excavated clay from the foundations was sufficient to produce enough cob to finish the house walls on the same foundation footprint.

Determinate negation

- It was determined unnecessary to harvest clay in the mountains as the exact amount was excavated from the foundations.
- When collecting river sand, I realised that the combined effect of local villagers and the municipality harvesting sand from levees probably contributed to the undercutting of riverbanks and caused the chronic downstream erosion. I discovered through tests that river sand produced the weakest cob and that black wattle seeds germinated in these cobs causing further weakness. I instead opted for crusher dust: a heterogeneous mix ideal for cob (Evans, Smith & Smiley 2002), which was stronger and a reasonably affordable alternative.
- I had a natural aversion to cement because the industrial processes used in its production are unhealthy and unsustainable (Pearson 2000). I therefore opted for using almost pure lime mortar with about 5% cement added simply as a catalyst to speed up curing. The lime mortar foundations and stem walls breathe better than concrete, which means water does not sit behind retaining walls but drains while moisture evaporates - this would not be the case with the cement and plastic walls that are stipulated aspects of conventional construction (South African Bureau of Standards 1990). The southern side of the house was built partly underground in a climate characterised by an average rainfall of 50mm per month. This would normally be deemed risky, however I found that no plastic moisture barrier was needed and with the lime mortar, damp was not a problem in the interior.
- I followed the guidelines of a research paper on harvesting timber by moon cycle (Horn n.d.). However, it was determined that the recommendation to

wait for the wood to dry before debarking makes debarking an unreasonably tedious and laborious exercise with an unjustifiable labour component, as well as resulting in an inferior finish due to the damage done through the debarking process. My first beams were very irregular and - when debarked - I subsequently realised, too thin. With experience, I learnt that the most time-consuming task was not felling and transportation but tree selection.

- I thought I would build a temporary roof over the site but this project was in the end deemed impractical. A temporary roof requires the harvesting of additional timber from the forest, which then needs to span the entire site. Some of the beams are huge. Transport then becomes a problem with the only real benefit accruing in the form of good firewood because of the beams exposure to the elements. This is far too much work for a temporary shelter. The alternative - commercial wood - is prohibitively expensive. A determinate outcome was to build stone pillars over the site before commencing cobbing. These are waterproof anchor points over which temporary shelters can be constructed.
- For roof insulation material, we placed wool into bird netting so that we could wash it in the river. The flow of the river over the material quickly waterlogged the wool making it extremely heavy and difficult to manage: with difficulty, we hung the sacks, which took many days to dry.

Practical determinate truths (new theses, antitheses or syntheses)

- A cob wall is much stronger than conventionally prescribed brick walls.[44]
- Clay was discovered on site, which meant we didn't in the end need to transport clay, which fortunately justified the original choice of cob as the right material choice for construction.

[44] We built one wall of the house conventionally. This is a double-walled baked brick and mortar wall designed to facilitate the natural conduction of cool air from the south side through a moist charcoal bed. This was to function as a spontaneously operational air conditioning system. It is observable that this wall is not as strong as the cob walls we built.

- Harvesting river sand from levees is not sustainable. River sand is unsuitable and inferior to commercially-available building sands.
- Lime mortars are considerably cheaper than cement, saving more than 50% of the cost for laying foundations stem walls and floors.[45] Lime mortars breathe better than cement concrete; this solves dampness problems provided proper drainage is also used.
- Harvesting by moon phase consists of harvesting when trees are de-sapped. This ancient technique, combined with environmentally-friendly wood treatment, means that beams unexposed to rain and sun do not decompose or attract wood beetle. Wood exposed to the elements dries out, cracks, and attracts black moulds.
- Protecting cob from rain is necessary. Paradoxically a high cob wall is less prone to damage then a low cob wall, the latter deteriorates quickly because it is more quickly saturated with water. Stone pillars incorporated into design can serve as useful waterproof anchor points for temporary roofing prior to beginning the cobbing process.
- The work involved with cleaning and drying wool determines this mode of insulation material impractical, the determinate solution was a light clay/straw mix. The clay coats the organic material protecting it from pests.

Key determinants confirmed

Community access (availability) to natural resources, particularly forest products, is essential to building one's house using natural materials.

[45] Our cost amounted to less than R10 000. A similar project nearby using concrete cost R60 000 in materials to get to floor level.

4.2.2 Using industrial products, can it be avoided?

Theoretical aim and philosophy

The aim (as far as feasible) is to find substitutes for industrial products, which are expensive, have large carbon footprints and are often damaging to the environment (Pearson 2000).

Theoretical process

The theoretical process was born out of the literature, and out of ideas formulated while testing materials on smaller projects.

Theoretical problem statements identified

Most organic products decompose easily while treatment is usually toxic.

Theoretical thesis

It is possible to build a durable and comfortable house using only organic building materials.

Practical implementation, testing and problem identification

Prior to commencing the construction of the cob house, we experimented with various organic materials to ascertain their resilience to the elements. Outdoors we built a cob pizza oven, as well as a cob and stone outdoor seating area with a "*Litima*"[46] floor (Evans, Smith & Smiley 2002:315). We felled timber from the following exotic species: Blackwood, wattle, pine, poplar and blue gum poles and put the poles in the ground using earth mortars.

[46] *Litima* is a mix of cow dung and clay mortar.

Determinate negation

- Firing the pizza oven baked the cob into a waterproof structure. However, plants eventually started growing in the structure. Rain pitted the surface causing weaknesses (three years later). These processes increasingly undermined its lifespan.
- *Litima* floors outdoors are fertile ground for weeds, while the roots break up the integrity of the floors.
- Invasive tree wood poles placed in the ground decompose very quickly (poplar is more resilient as it is a riverine species).
- Unprotected earthen structures are prone to pitting from rain on the tops of structures and on the sides, where prevailing rain-bearing winds are persistent.
- Unprotected wood exposed to elements discolours and cracks and wood-barked sections attract beetle that groove interesting patterns in the wood.

Practical determinate truths (new theses, antitheses or syntheses)

Unprocessed organic materials are prone to decomposition. This makes them impractical for many outdoor applications without proper weatherproofing. It was determined that organic materials are only solutions if protected from the corrosive effects of the elements.[47] Stonework masonry as well as lime mortars are a valuable exception on the interface between weather and shelter areas.

Key determinants confirmed

The degree to which the organic material will be exposed to the elements is critical.

[47] We did not test thatch as a substitute for corrugated iron roofing as it is not grown locally (within 50km) and is much more expensive than corrugated iron. Furthermore, thatch would negatively affect the amount of rainwater we needed to harvest. We also discarded the idea of having a living roof on the cob house as the weight of such a roof is significantly heavier than a corrugated iron roof and I didn't want to over challenge the structural strength of the first cob structure I built.

4.2.3 Using mechanical equipment, can it be avoided?

Theoretical aim and philosophy

Machinery is expensive, often noisy and requires large amounts of energy to run. I wanted to test if it were possible to build a high-quality dwelling using just basic implements. I would use mechanical implements only if no manual equivalent was deemed appropriate.

Theoretical process

The early stages of the project of the theoretical process took place while considering the practicalities of a building site without grid power or a generator.

Theoretical problem statements identified

- Using machinery is cost effective.
- Cutting and transporting beams from the forest without a truck, crane and a chainsaw is difficult as the timber is heavy.
- It's not possible to cut straight wood angles without mechanical saws.

Theoretical thesis

It is possible to build a house of high quality using only simple, inexpensive implements accessible to most rural households and is it possible to do so without access to grid electricity.

Practical implementation, testing and problem identification

All excavations were carried out with only a spade, pick and wheelbarrow. Large quantities of earth were removed and the biggest determinant factor became where to store all the earth excavated. Soil types were separated. A flood in the interim determined the urgent need for swales; this is a good example of an emergent

determinate solution to the problem of where to dump the extra earth.[48] The excavated clay remained in the middle of the site where it was easily accessible for cobbing.

I used my old 1980's Mercedes Benz sedan worth about R3 000 as a tractor and hauled the wood out by lashing the poles to the tow bar. More recently, I have taken to debarking in the forest and carrying the wood out by hand, using three adults per beam in the process. Alternatively, the traditional non-mechanical method would be dragging the timber using a draft horse.

Initially, I compromised my (non-mechanical) values by using a chainsaw for felling, but after the noisy demolition of a small stand of forest in less than an hour, I decided this method was not really representative of my principle of care; a handsaw being a better way of spending time in the forest, particularly if harvesting at the right moon phase when the trees have less sap. This is remarkably noticeable as the saw blade slides through the wood without locking in sap.

For woodwork and roofing, I used an old cordless drill and a handsaw. I quickly learnt to cut straight edges but these were never perfect joins. As the entire structure was organically shaped, using uneven un-milled timber, the switching to precise angles did not work well in any case. It was therefore better to work determinately focusing on each piece of wood in its individual situation.[49]

Determinate negation

[48] Building sites often dump huge amounts of material. This constitutes a significant waste of energy and resources.
[49] I cannot overemphasise this point with regards organic shapes. It is not the rational discursive mind that is most useful; it is the ability to tap into the larger 'other' through determinate processes. Building, therefore, requires intuition and the ability to work creatively with the materials at hand.

- Deep dry clay excavations are not efficient without a digger loader; clay gets harder and more difficult to remove the deeper one goes. Therefore, for tasks such as putting in a conservancy tank and digging a well, mechanical equipment is preferable.
- My old cordless drill wasted much time. When replaced with new and more powerful equipment, productivity increased dramatically, illustrating the value of having the right tools for the job.
- The equipment used for woodwork determines what is possible regarding quality and speed of carpentry.
- Felling timber with a handsaw is not difficult at the right time of the moon calendar.
- Timber can be dragged out the forest with an old car or carried out by a few people sharing the load.

Practical determinate truths (new theses, antitheses or syntheses)

Although the original thesis is confirmed, a simple quality house can be constructed with basic implements available to most people. The original question, however, is determined redundant when the project incorporates materials with embodied mechanisation, which is true of inputs such as cement, lime, milled timber and corrugated iron. When using these materials, one is essentially employing outsourced machinery in the construction process. This being said, the focus of the original question has actually shifted, from not having the utility of grid-electricity and therefore mechanical implements, to asking whether this is a barrier to building a quality house?

I believe the loss in utility, having limited power and equipment, is offset by solutions that arise through determinate creative processes such as placing excavated sand as swales, and more careful and sensitive selection of timber for unique utility

purposes. What becomes very apparent is that creative organic construction solutions are determinately anchored in the actual job, while rational discursive solutions tend to support rather linear solutions to problems. Linear approaches tend to manifest as the appropriate methods for working on rectangular houses with uniform bricks and milled timber. Linear processes favour grid energy and mechanical tools to achieve the necessary accuracy involved, while organic processes require a more centred creative and flexible approach to materials and available equipment. The difference can also be ascribed to the difference between a tradesman and an artisan.

Key determinants confirmed

- The materials' embodied mechanisation;
- The creativity (will) to transform the materials with available tools and resources; and
- Available finances.

4.3 Producing one's own organic food and beverage and managing personal primary health with the use of medicinal plants

This section discusses how we managed to grow our own food, produce our own beverage (brewing beer) and make use of locally grown and wild harvested medicinal plants. The production of our own food focused essentially on the goods that were feasible at the scale of our plot, which includes vegetable and fruit, meat, eggs and dairy products. Apart from some occasional green manures, no cereal crops were grown on our plot.

4.3.1 Can one decouple from the poisoned food chain if growing organic vegetables and fruit for daily supply and variety?

Theoretical aim and philosophy

The theoretical aim here is to offset the supermarket fresh produce basket costs with healthy organic home produce and offset energy needs by making on-site harvesting of fresh produce possible (Seymour 2003).

Theoretical research process

The theoretical process emerged when attending lectures for the completion of my Bachelor's of Philosophy degree with Sustainability Institute, School of Public Management, Stellenbosch University.

Theoretical problem statements identified

- Most vegetables are only seasonally available (Fukuoka 2008).
- Livestock and pests will reduce production if they get into a vegetable garden. (Rosenberg & Linders 2004, Devlin & Zettel 1999, Mollison 1991, Seymour 2003).
- Crop rotation is difficult in a limited space.
- Fruit trees take a lot of sunlight space and fruit is only available after many years of maturation.
- How does one sow beds if no-till methods are preferable (Mollison 1991)?
- How can one simplify and maximise irrigation for optimal utility towards water conservation?

Theoretical theses

- Follow a planting calendar to ensure all-year supply of vegetables (Rosenberg & Linders 2004).
- Fence off the vegetable garden and grow hedges to deter predators and protect crops from free-roaming poultry (Mollison 1991).
- Use intercropping, vertical, and horizontal integration to maximise sunlight space (Mollison 1991).
- Plant fruit trees in pairs orientated to morning and evening sunlight in bracken soils employing Fukuoka's no pruning philosophy (Fukuoka 2008).
- Use rabbit tractors to eat down weedy beds followed by chicken tractors to dig in manure (Mollison 1991).[50]
- Run irrigation pipe along hedgerows and into food gardens with micro-drippers.

Practical implementation, testing and problem identification

- Follow a planting calendar: Our particular geographic area straddles both the winter and summer rainfall areas. The planting calendars we used (Rosenberg & Linders 2004) were applicable for winter and summer rainfall areas respectively so it was not precisely clear which crop planting times were optimal. Many of the crops planted according to the calendar did not produce. Crops that did produce usually produced in abundance but often over a short duration. Sometimes crops were out of sync with the calendar, for instance, summer crops in winter.
- Fence off the vegetable garden and grow a hedge of thorn trees and edible berries: However, a few *caveats* undermined this approach: a fence does not prevent birds from eating produce; it does not prevent baboons from eating produce; and it keeps out beneficial livestock that eat predator insects such

[50] These are movable cages containing livestock on small parcels of ground, in effect the livestock act like rotavators digging in the manure.

as snails, slugs, caterpillars, cutworms. Approximately 90% of fruit tree produce was lost to birds and fruit flies in the first year our fruit trees produced fruit.

- Intercropping, vertical and horizontal integration: As much as one tries to organise intercropping, different plants grow at different rates and at different times. Plants that sprout first grow fastest and exponentially out-compete the others. A single butternut creeper can quickly cover an entire vegetable bed or garden and still not produce a single butternut. This is a good example of the evolutionary paradigm negating the systems paradigm "...'lock-in' (survival of the first rather than survival of the fittest)..." (Constanza 2003:661).
- Fruit trees take a lot of sunlight space: Fruit trees of different species grow at different rates and, once overshadowed, smaller fruit trees struggle. Some trees produced on year three but most take longer. However, we erred in thinking that we would have to buy all our fruit for household consumption, as much of our fruit consumption shifted to wild and cultivated berries over the interim period.
- Rabbit tractors to eat down weedy beds followed by chicken tractors to dig in droppings: There were often plants in the beds that were still productive because of the intercropping regime. This represented a conflict of interests. Although the rabbit and chicken tractors were of good design, they were cumbersome and often did not fit the shapes of the beds. The animals placed in the tractors were usually depressed and attracted carnivorous predators at night causing great trauma, meaning they didn't do the intended job adequately. It proved to be a management-intensive system. Either animals got wet when we irrigated or patches of land didn't get water where animals were sheltered.[51]

[51] I think this is a fundamental difference between Fukuoka's methods, which are more spirit orientated and Mollison's, which are more Cartesian. I found that many permaculture ideas made perfect sense on

- Laid irrigation pipe with drippers: Burying pipes protects them from damage by livestock and animals. Buried pipes are however not easy to locate and are often damaged when digging. Drippers often block and therefore produce a variable amount of water. Drippers only irrigate a small area.

Determinate negation

- Planting calendar: in the first years, the vegetable and fruit yields when using a planting calendar were so meagre and lacking in variety that they failed to satisfy domestic requirements. There was a two-month period just after winter when there was no cultivated food available at all. We realised we needed to focus on crops that produce reliably in our local habitat.
- Predators: the predator insects decimated most of our young butternuts while slugs caused losses on leaf crops. Birds - particularly the mouse bird that flies in flocks - ate most of our cabbage before moving onto the spinach. A large variety of birds ate our orchard fruit and strawberries. Rodents eat seedlings. It is not feasible to be home all year round, so whenever we left our smallholding there was a threat that all our work could be lost to a troop of baboons.
- Cultivation technique: Generally, the controlled intercropping of vegetables did not produce all the varieties planted.
- Fruit trees: the fruit tree-planting regime resulted in certain species growing quicker and shadowing other species that then were stunted. We had ample fruit from the berry bushes that grew on site.
- No till method: The rabbit and chicken tractors cut and till method was not practical. The top dressing no-till method did not work in our trials.
- Irrigation regime: The dripper system originally laid out has been abandoned as a complete waste of resources and time. The main issue we faced in this

paper but were determined impractical after testing. This is true for some of Fukuoka's philosophies in practice as well; this emphasises Fukuoka's point about interventions being site specific (Fukuoka 2008).

regard was how to irrigate our food gardens when we were away for long periods.

Practical determinate truths (new theses, antitheses or syntheses)

- Planting calendar: It is better to facilitate and grow species flexibly according to when they germinate on site with reference to both local climatic conditions and other farmers in the village. A personal calendar can be developed through one's own determinate experience, and be locally applicable to the site's specific microclimate. Generally, we determined that few crops coincided with the calendars; on our site in early spring the first food available was leaf crops, and in early summer, we started relying on berries, zucchinis and onions and tree fruits. After the summer solstice, we harvested peppers, aubergine and potatoes and later, towards autumn, watermelons and butternut were sometimes available. Root crops and peppers were available going into winter. At this stage, there are always new exceptions to this general rule. One way to eat these vegetables out of their optimum peak production times was to convert excess supply into preserves or dry them. For most of the warm months, we produced tomatoes, spinach and salad and harvested wild food (mostly leaf crops and mushrooms). In the second year, we adjusted cultivation methods with slightly better results. Seed in the ground left over from species germinated and gave a harvest anyway. During a certain period, we went away for three months and returned to find abundant cherry tomatoes, spinach, peppers, and zucchinis, which had mostly grown wild. We realised this type of farming produced locally appropriate low maintenance food. We dubbed this Fukuokan "do little" approach (Fukuoka 2008:15), 'gorilla farming'[52].
- Predators: Multiple techniques are needed to control the loss of production to predators and predation needs to be factored in, one must plant abundantly,

[52] 'Gorilla farming' consists of intercropping through the survival of the fittest.

a fence being permeable to most predators. Ducklings foraging with their mother were used with great success in the more robust vegetable garden. This proved a success as ducklings ate the protein insects (not readily available in the other forage areas due to the competition with chickens) and avoided eating crops, which they had in abundance in other foraging areas. With this webbed-foot, low-damage duckling system, seedlings and salads are less vulnerable to trampling but sensitive areas could be protected with portable mini-greenhouses. Usually damage is minimal with the small ducklings preferring to walk between the plants. We discovered a certain local weed species, which the mouse bird preferred above all our crops. This we did by observing the birds' eating habits. We could cultivate this weed but we alternatively grew sacrificial cabbage and harvested more spinach this way. 'Gorilla farming' means it is more difficult for birds to destroy the crops, as they often don't find them. Bringing in inputs such as brewing malt and bailed hay attracts rodents, while the busy homestead environment deters their predators, a cat is perhaps needed but this was not tested. The baboons eventually found our vegetable patch in year three and ate most of our maize. Fortunately, there has been limited damage thus far from baboons. No solution is currently tested, other than leaving a dog on site to deter baboons when away, and firecrackers are used when at home.

- Cultivation: Canopy control and mulching management for existing food crops interspersed with traditional vegetable beds for future crops. Useless species are therefore weeded and placed under useful species as mulch. Species taking over are cut back and leaves are placed under and around useful plants as mulch. When we cut back the plants, we put the off-cuts immediately below the plant. This produces thick mulch that subsides over

time. If one lifts this layer of mulch, one bears witness to a spectacular diversity of insects co-existing for decomposition on site.[53]

- Pruning: Fruit tree canopies pruned to manageable size. Pruning is used to manage fruit tree canopy growth although our available land size is not conducive to Fukuoka's "no prune methods" (2008: 58).[54] Fruiting trees are covered with bird netting and organic fruit fly traps are hung from the branches.
- Tilling: New beds are tilled by hand. Tilling is used in, around and as a supplementary activity to 'gorilla farming'. Stations or beds are dug out, filled with compost and mulched. Seedlings are then placed into the ground by parting the mulch.
- Irrigation: In our climate - characterised by regular rainfall - and using the gorilla method, hardy food crops survive without irrigation but fragile beds do need watering. This is a problem if one needs to leave. A solution, if neighbours care to oblige, is to have them watering while away. They can barter this service by harvesting food for their own homes. Failing this, an irrigation system with electronic timer would be needed. The determinate finding is to combine fragile crops under one irrigation sprinkler (system), and the hardy crops heavily mulched without irrigation, as they can survive on regular rainfall alone.

Key determinants confirmed

- A vegetable garden should be close to the living space, so available land close to the homestead is needed.

[53] This activity really pays back only in the following season, as an exercise of patience as opposed to instant gratification from the use of energy intensive and mechanised weed eaters, shredders and rotators. In the end, the results are the same.

[54] We are therefore shifting to an approach that is antithetical to Fukuoka's. There is admittedly a principle of harm being utilised; we, however, have determined that our roles as agriculturalists often include inflicting some harm.

- Pest control techniques (exclusions zones and farming techniques) are required to handle a productive operation. Access to irrigation water is an undeniable comparative advantage.
- Localised knowledge is of value.

4.3.2 Primary health care with medicinal plants, is it feasible?

Theoretical aim and philosophy

Can one cultivate and gather sufficient medicinal plants to maintain the family's primary health needs? (Refer to appendix 1 that lists some of the healing plants that were cultivated on site or harvested in the wild).[55]

Theoretical process

The theoretical process relating to health care and medicinal plant was mostly born out of reflection in commemoration of my grandfather, who was an herbalist, and it was enriched by subsequent literature.

Theoretical problem statement

- Conventional medicine is costly.
- Commercial drugs such as antibiotics are harmful to humans and the environment (Bieler 1966). In a closed composting toilet system, these drugs would enter our environment via the food chain.

[55] This is difficult to convey in writing, particularly as my health improved dramatically from the moment I started living off the land, thus providing very few opportunities to test the healing abilities of herbal remedies. The relatively short research period of four years qualifies me as a novice herbalist at the most. I must credit my grandfather, Hennie Mentz, a registered herbal healer, for his inspiration as well as handing down his knowledge. Hennie Mentz pioneered the promotion of herbalism in South Africa, documenting and using treatments he gleaned from books and African sangomas. He was part of a small minority of European descendants who recognised the incredible healing properties of local indigenous plants (Iggulden 1982).

Theoretical thesis

One should, as far as possible, supplement conventional health care by growing and using medicinal plants.

Practical implementation, testing and problem identification

Over the four-year period, the following health issues cropped up:

- Gastro intestinal problems
- Infected open wounds
- A severe allergic reaction
- Minor burns and rashes
- Malaria.

In all cases, consulting a doctor was avoided with three exceptions. The malaria was contracted abroad and treated conventionally. With the first bout of gastroenteritis, the habit of calling on a doctor prevailed[56]. This habit/inclination also prevailed when it came to treating a serious allergic reaction. In the first case, conventional treatment with the *Coartem* drug[57] and diagnosis indicated a minor but recurrent malaria strain with subsequent recurrence, which was allowed to follow its course without treatment.

With regards the case of gastroenteritis, the doctor prescribed a one-week course of general antibiotics, which resulted in little relief to symptoms. Symptoms only improved after ingesting an infusion of turmeric root (Heinamann et al. n.d.).

An allergic reaction caused by eating mussels was treated conventionally because of constriction of the airway in the throat. In this case, the hospital injected a double

[56] This habit of consulting a doctor is probably the biggest barrier to converting to herbal healing.
[57] Coartem is a broad spectrum malaria drug available from pharmacies. Once taken, it is effective against most strains of Malaria, except cerebral malaria. Self-administering is therefore dangerous, as once taken, it masks symptoms and the specific malaria strain can no longer be identified, this I discovered too late in a run-down hospital in a very remote corner of Eastern Madagascar.

dose of adrenalin, which had adverse effects on the patient.[58] Again, symptoms only started improving after the ingestion of an herbal rosemary infusion.

All other listed ailments were treated with success using plants grown locally and listed in appendix 1. For the second case of gastroenteritis, no doctor was consulted. Infusions of turmeric cleared the problem up in two days (Heinamann et al. n.d.). Over the four-year period, I have experienced a significant mind shift. When very sick my first thought is no longer, 'help doctor' but 'help garden'. Most often, I am using medicinal plants as well as homegrown foods to manage my own health and mental well-being. A determinate behaviour change is that I feel medically vulnerable when away from my garden; my diet is suddenly not conducive to maintaining the same degree of health as it is when at home. I therefore like to take a small supply of medicinal food with me when I travel. This keeps me in my homegrown state of optimal health. I ingest these healing foods as I see fit, especially if any hint of symptoms arise.

Determinate negation

Medicinal plants should not be considered supplementary to conventional medicine for primary health but rather as the first line of defence when symptoms appear.

Practical determinate truths (new theses, antitheses or syntheses)

New thesis: conventional drugs should be considered supplementary to medicinal remedies, which are the cheapest locally-available first line of defence. This conclusion arises from a rather short four-year research experience using medicinal plants. The exception to this would be serious illnesses that included viruses with known and tested conventional remedies; in which case conventional approaches would arguably remain the first line of defence. The practitioner's own level of

[58] This example and other cases where general treatments, such as general antibiotics diagnosed for specific health problems, are supportive of Bieler and Bateson's assertions that conventional medicine is a 'bag of tricks' approach to healing and not a holistic healing approach (Bateson 2000, Bieler 1966).

knowledge of appropriate medicinal treatments would be the determining factor here. For instance, my quick treatment of malaria with self-administered *Coartem* meant I overcame malaria far quicker.

Key determinants confirmed

- Access to land (private and wilderness) is required to harvest medicinal plants.
- Community harvesting rights are pivotal when harvesting in commonage or municipal land.
- Medicinal healing requires a minimum of plant knowledge.

4.3.3 Producing, culling and preparing one's own healthy meat in an ethical manner, is it a viable alternative to meat of doubtful origin?

Theoretical aim and philosophy

The industrial meat industry is profit-oriented, thus a disincentive to proper animal care (Pollan 2009). The aim is to create relatively ethical, healthy conditions in which meat animals are bred, raised (preferably with free range or large paddocks), treated and culled.

Theoretical process

The theoretical process emerged out of reading referenced books and attending lectures. The *Earthlings* movie, directed by Shaun Monson (2005) was very influential to my thinking in this section.

Theoretical problem statements identified

- Small livestock such as ducks, rabbits, chickens and goats need purpose-built grazing paddocks or they will escape.

- Livestock animals kept on a small piece of ground will quickly degrade all soil life in their paddocks with overgrazing. Goats are damaging to fences and trees and should be securely fenced off or tethered.
- Animals will get into vegetable gardens and destroy produce. Predators, such as snakes, birds of prey, wild cats and otters, will kill all livestock.
- Culling: culling meat is stressful for both the person culling and the animal.
- Preparing meat safely for cooking is problematic without a sterile processing room and refrigeration.

Theoretical theses

- Build a secure holding area for livestock to prevent escape, as well as a multi-livestock barn with adjacent multi-livestock paddock, both areas being predator-proof. Fence off entire premises as well as vegetable garden to create a broader rotatable grazing area. Tether goats during the day out on commonage. Herd all animals into the barn at night.
- The most humane death is a surprise, instant death (in other words, executed as quickly as possible).
- One requires a sterile meat processing room and fridge or freezer; failing this, an animal should be cooked and consumed as soon as possible after slaughter.

Practical implementation, testing and problem identification

- In practice, we discovered fencing was usually inadequate, being semi-permeable to both predators and livestock. We learnt that livestock prefer to graze in close proximity to the homestead. The year we spent tethering and fencing in goats was deemed, in the end, to be an unnecessary process. Goats prefer to graze close to the homestead and will come back to the barn at regular intervals to ruminate. We believe all livestock's natural

domestication and fear of predation are factors determining their constant orientation around the homestead. A fence does not really deter predators as any weakness is capitalised on. We lost livestock to predation up until we acquired a dog, after which predators kept a healthy distance. Vegetable gardens do however need to be securely protected from livestock.

- By learning how to cull our own animals, we realised that there is no such thing as instant death. Monson's movie, *Earthlings* (2005), affected us greatly, as it portrays the gruesome and cruel manner in which animals are slaughtered in abattoirs; this comforted us in the need to create a better environment for the animal about to be killed. The methods adopted for killing were as follow: for goats a bullet in the head (later a knife to the throat), rabbits a blow to the head, chickens,[59] ducks and geese's heads chopped off with an axe.[60]
- Homegrown meat cooked the same day is usually really tough and unpalatable. It is better to hang the meat or marinate the meat in a cool shady fly-free area for at least 24 hours (the period should be increased with larger animals). Meat can be kept like this for much longer periods if salted.

Determinate negation

- Fencing is not required to keep livestock near the homestead barn.
- There is no such thing as an instant death as death is slow process.
- You do not need a fridge or freezer to store meat for more than a day.

Practical determinate truths (new theses or antitheses or syntheses)

[59] We stopped culling hens after we discovered - while preparing the carcasses for cooking - the constellations of future egg yolks in various stages of development, thus figuring eggs to be a better return on effort.

[60] The ethical stance here is that instead of outsourcing our killing to others by shipping our animals out to mass slaughterhouses, we are taking responsibility for the entire process by carrying out the slaughter with the least amount of trauma to ourselves. Because killing our own livestock is not fun, we have found that we consequently eat less meat.

- Domesticated livestock (in our case: chickens, geese, rabbits, ducks and goats) do not need to be prevented from straying too far from the homestead barn.[61] In the case of goats it is quite the opposite, a contained goat can be extremely damaging to fencing and trees, but a goat left to forage unhindered will not cause undue damage to fences and trees.
- We determined that the most humane way of slaughtering an animal is to hold it quietly, allowing it to relax and then mentally invoking/preparing - for animal and for oneself - the act of slaughter. After this moment of serenity where the animal ceases all struggle, the aim is to execute the slaughter in a controlled unrushed way and then to leave the animal for a period alone for the process of dying. Unlike the animals portrayed in Monson's movie, no processing of the meat is started until all signs of life have ceased.
- Meat needs to go through a maturing process at cool temperature to bring out a palatable texture and flavour when cooked. Sterile environments are bacterially vulnerable as both the good and bad bacteria are destroyed through sterilisation. Meat can be stored without a fridge if properly salted.

Key determinants confirmed

- Access to a barn, storage space and facilities are a prerequisite.
- Access to extensive grazing (ideally proximate or supervised) and/or fodder is essential.
- Access to kitchen facilities and water is essential to process meat in hygienic conditions.

[61] Our female rabbits remained contained in a safe enclosure with outside paddocks over the entire period, as we wanted to control the birth rate and avoid environmental issues, should they escape in the wild. The males were allowed to free roam.

4.3.4 Free range eggs and manure, are they viable alternatives?

Theoretical aim and philosophy

The aim is to have a constant supply of safe, healthy, free-range eggs and barn litter that makes for nitrogen-rich compost from which to grow the vegetable garden.

Theoretical process

The literature studied towards the completion of agriculture modules at the Sustainability Institute, School of Public Management, Stellenbosch University formed the basis of this theoretical process.

Theoretical problem statements identified

- The cheapest egg production is a high protein diet obtainable through extensive foraging with minimal feed input.
- Extensive grazing means chickens lay their eggs all over the place making eggs and manure collection problematic.
- Chickens need a cock in order to achieve a better egg production but cocks are noisy and will possibly irritate neighbours.

Theoretical thesis

Herding chickens into a barn at night, only releasing them around midday after their eggs are laid and keeping the barn dark so the cock is tricked into waking late will ensure a regular and centrally-located supply of healthy free-range eggs.

Practical implementation, testing and problem identification

Once the chickens realised the danger of predation they spontaneously kept close within 200 meters of the homestead barn. A lone cock will herd and manage his flock

of hens and will always keep tabs of breakaway groups of hens who are usually very focused on hunting the right ingredients for egg production. The cock also keeps an eye on predators and raises the alarm if there are any nearby. At night, all chickens retreated to the safety of their barn. In the morning if kept confined too long, chickens make a lot of noise in protest. It is determined better to let them out at sunrise. More than 90% of eggs were laid in the barn. The barn litter left over from a night of confined livestock is significant.[62] Chickens produce a regular supply of high quality eggs with a minimum of bought inputs. They also enjoy eating fly maggots from livestock manure, which is an indispensable anti-fly remedy necessary in summer. Chickens eat other pests around the homestead. Cockroaches, snails, slugs, crickets, locusts, snakes, mice nests are therefore all controlled. Chickens produce eggs almost all year round, even without a cock being present.

Determinate negation

Chickens will spontaneously go to their barn in the evenings as well as lay their eggs in a barn. The function of chickens is not exclusively egg and manure production, as they are also valuable for maintenance of a pest-free environment around the homestead. A cock is not necessary in order to have a constant production of eggs.

Practical determinate truths (new theses, antitheses or syntheses)

Chickens can be farmed without fencing with a low input, extensive foraging technique and still produce manure and eggs centrally and conveniently in their barn. Furthermore, chickens are indispensable in controlling pests that, in turn, become ideal ingredients for the creation of the perfect egg. After sampling a homegrown egg, one is convinced of its absolute superiority (shell strength, colour and taste) over conventional eggs. Determinately conventionally-farmed eggs can no longer

[62] A multi-livestock barn needs to be properly designed so that animals of different species have separate sections. It is probably not ideal hygienic practice for manure from different species to intermingle in communal spaces where sleeping, eating and drinking are taking place.

compete, as their quality and taste is tangibly mediocre compared to the true homestead eggs.

Key determinants confirmed

- Access to land (private and wilderness) is a prerequisite in order to offer chickens free-range space.
- A barn to shelter the animals and protect them from wildlife is a requirement.
- Access to forage and/or fodder is key.
- Access to water is also important.

4.3.5 Dairy, milk and cheese from goats, is it viable?

Theoretical aim and philosophy

The aim is to produce enough healthy, fresh milk for domestic cheese and milk requirements from a small ruminant, the goat.

Theoretical process

Referenced books as well as well as periodical interviews with goat farmers and cheese makers mostly informed the theory.

Theoretical problem statements identified

- Milking goats is a tedious job.
- Milking equipment is very expensive.
- Someone must do the milking every day or the goat will go dry or get mastitis.
- The raising of goat kids will use up most of the milk produced.
- Cheese making requires specialised knowledge equipment and facilities.

Theoretical thesis

A lactating female goat, milked by hand, will produce enough milk to cover domestic fresh milk needs but will not be sufficient for making cheese. A single goat cannot produce milk year-round but a second goat can be used to produce milk for the remainder of the year by staggering the kidding. A domestic cheese operation requires specialised skills, equipment and infrastructure.

Practical implementation, testing and problem identification

Our first experience was with a single goat, acquiring milk with our amateurish hand-milking techniques. This, combined with an inexperienced goat that had never before been milked, resulted in skittish behaviour. The goat often stood in the milk bucket. However, enough milk was yielded for drinking but not for cheese manufacturing. Not utilising a proper milking stand made the task more difficult. No cheese was produced with the goat's milk before the goat contracted mastitis due to an inexperienced helper who failed to successfully milk the goat two days running.

We then started making cheese with cow milk bought from a neighbouring dairy. The cheese was made at home using normal kitchen pots and appliances. My first cheeses were cottage cheeses from left-over rancid milk drained in a drawstring bag (we did not have a fridge). I also made semi-soft and hard cheeses, which were successful, first time round. This was achieved by following rough recipes jotted down from a demonstration offered by a neighbouring small-scale farmer, Petro Notling (2010), who made her own cheese on a small scale from Jersey cows. Finally, in 2012 we produced high quality cheese from three British Alpine dairy goats, using the excess milk left over after feeding the goat kids. This produced large surpluses that became a valuable cash revenue stream for the operation.

Determinate negation

At the stage when our first goat ran dry, my original starting thesis stood unchallenged with no determinate negation manifesting through the experience. Further practical goat knowledge was acquired through farm visits in South Africa and an intensive five-month goat farming and cheese making internship in France. This latter process did lead to the determinate negation of the original thesis, which can be described as follows.

A single dairy goat can be milked in less than five minutes without much effort using a proper milk-stand. A good dairy goat will produce an average of usually over two litres of milk per day provided there is good feed. This is more than enough to feed goat kids and cover domestic fresh milk needs. Fresh cheeses can be produced from the excess milk provided during peak lactation periods by following an extremely simple process. Fresh goat's milk cheeses require less milk per kilogram then hard cheeses. Excess milk can be carried over for a couple of days if refrigerated and used when the quantity justifies the energy required to make cheeses. Goats should preferably be milked morning and evening daily, or once a day as a last resort. An unweaned kid can be used as a backup milker by leaving it with the mother.

Practical determinate truths (new theses, anti-theses or syntheses)

From a single kidding over a period in excess to a year, a single lactating milk goat such as the alpine goat can be used to produce the domestic fresh milk requirements for a home, provided she is regularly milked. Excess milk will be produced that can be used to raise goat meat and produce cheese with little effort and using basic kitchen equipment. Utilising more than one goat will provide marketable surpluses.

Key determinants confirmed

- Access to land (private and wilderness) is a prerequisite.
- A barn and milk stand to shelter and tend to goats is essential.
- Access to dry forage and/or fodder is essentials for ruminants.
- Access to quality water, especially for dairy goats, is critical.
- Access to kitchen facilities, heating and basic utensils are key requirements for making cheese in good hygienic conditions.

4.3.6 Brewing beer, can it contribute to independence?

Theoretical aim and philosophy

The aim was to brew beer for home consumption to offset the cost of the monthly beer bill.

Theoretical process

The theoretical process was shaped by explanations and notes taken from visits to a master brewer (Muhl 2010), as well as by the literature consulted.

Theoretical problem statements identified

- Brewing beer requires expensive equipment.
- Brewing beer requires laboratory-type sterile cleanliness.
- Brewing beer is a complex and time-consuming procedure that takes a whole day.

Theoretical thesis

It is possible to brew and bottle beer using basic equipment and recycled bottles. Although this beer will probably be less palatable than commercial beer, it will certainly be healthier and cheaper than buying beer and the by-product - spent grain - offsets the cost of animal feed.

Practical implementation, testing and problem identification

Using a pot and a donated plastic keg, I started brewing. The procedure takes a day to complete. A week later, bottling is done and two weeks later, one can finally test the beer. At first, the beer was not at all palatable. It is unfortunate that each bad batch requires trial-and-error changes to brewing procedure and can only be sampled at three-weekly intervals.

Luckily, for my morale, I brewed a good batch within my first ten attempts. This beer was of very good quality and became the benchmark knowledge basis for subsequent batches, these subsequent batches tasted good more than 50% of the time.

In my second year of brewing, I gained more confidence and consistent results; the quality was high 80% of the time. This allowed me to enlarge my brewing capacity to 20-litre batches. A simple method evolved over this period that could be completed with a 10-litre pot, a 20-litre stainless vat and 20-litre fermenting vat. I bottled an average of 20 bottles (750ml) a week with this system (an ample amount with which to supply friends and family), and, in the end, I was consistently producing high-quality beer. The capacity was then adjusted to produce the exact feed requirements (spent grain) to feed the entire livestock operation. Fifteen kg of spent grain per week produced marketable surpluses sold as an artisanal product.

Determinate negation

To produce beer in sufficient volume, the following parameters need to be considered: the quantity of beer; the quantity of spring water that can be transported by hand; the method by which the volume of liquids will be heated; the time one is prepared to spend grinding grains (by hand or machine); the time required for bottle

cleaning and bottling; the appropriate method for cooling and heating of the liquids and the pasteurising bottles; as well as the availability and cost of inputs (fuel, quality water, hops and malt). Through careful consideration of these factors through determinate experience, a novel home brewing system can be implemented to produce beer far superior in health virtues, taste and quality to commercial products.

Practical determinate truths (new theses, antitheses or syntheses)

It is possible, using simple but specialised equipment, to brew beer that is consistently superior to commercial beers. Specialised sterilised conditions are not needed during brewing as the brewing process itself sterilises the batch. Subsequent to the brewing process basic, hygiene should prevent contamination.

Key determinants confirmed

- Access to inputs: grains and water are prerequisites; access to fossil fuel can speed up the process significantly, but the use of biomass is also suitable.
- Access to basic specialised equipment is pivotal.

4.4 Harvesting one's own energy and water

This harvesting section looks at the systems we have put in place to harvest power from the elements, namely the sun and rain water, as well as harvest biomass, in the form of wood for fuel.

4.4.1 Solar power, is it a viable alternative?

Theoretical aim and philosophy

The aim was to live off-grid from municipal services and harvest power from the sun to cover our modest electricity requirements. This was deemed necessary in principle to decouple the household from expensive grid-energy reliance.

Theoretical process

The theoretical process consisted mostly of periodical discussions with experts, lectures and literature analysis.

Theoretical problem statements identified

- Solar power installations are expensive and do not provide enough capacity to run most electronic appliances.
- Solar systems are valuable and, if kept outdoors, are vulnerable to theft.

Theoretical thesis

It is possible to live autonomously and well off-grid, without being burdened by expensive electricity bills, when harnessing solar power for electricity.

Practical implementation, testing and problem identification

Initially, we were donated a 'Flexicell' (research in progress) test solar panel. In exchange for its use, we were asked to send feedback to the parent company. This panel was rigged up to a basic regulator and a single battery. The system ran some basic 12-volt fluorescents lights, an alarm system, powered a cordless drill and a laptop. Unfortunately, our inexperience with solar meant we drained the battery below the 50% mark on a number of occasions, which alarmingly deteriorated battery performance as a direct result.

In 2011, we invested in a more powerful system. With the new system, we ran the same appliances on a doubled battery capacity. We installed energy efficient bulbs (1Watt), and more actively managed loading capacity. Despite this, we yet again damaged the performance of the battery bank. This means that over the initial two rounds of batteries, we had damaged battery lifespan. Up until this point we had spent R4 000 on our modest battery banks and then updated the existing batteries with even more capacity. On both initial rounds, we used the same brand of sealed

gel batteries, which were recommended to us by solar distributers. The battery brand we used has not been very resilient. At a price of R1 200 each we feel these sealed gel batteries have not served us well. It seems to us sealed gel batteries are not as reliable as wet cell batteries, our subsequent investment.

On the panel side of the solar equation, there are no significant determinate problems. The panels' high productivity has been a personal surprise. On cloudy winter days the reverse is true, either one must significantly cut one's energy use or source back-up charging facilities.

The panels produce excess energy in summer; this means batteries are easily recharged and, consequently, the panel's excess production, unless utilised, goes to waste. A professional solar distributer calculated our energy requirements and designed the system to cover us for low solar output periods, that is a system inappropriate to peak sunlight periods.

Adding a fridge and/or a water pump are possible options for soaking up the additional energy produced. The theory behind these ideas is that a fridge's thermostat will run the compressor during peak sunlight periods on the most part. With still additional power available at noon, water can be then pumped to a holding tank and then gravity fed through an inline micro hydropower generator at night, if the site allows for it. Otherwise, the energy is just being lost to a regulator.

We upgraded our system in 2012. With this new system, we have finally managed to balance our energy consumption and production. This is a 24-volt system incorporating four 6-volt flooded batteries. The batteries are connected to two 100-watt panels and an inverter that produces 220-volt household alternative current. This system is connected to lighting, plugs and an energy efficient fridge/freezer. The fridge/freezer functions as a balancing regulator absorbing extra solar power. Additional power available at noon on cloud free days, is used to pump water to an

elevated tank, this ensures water autonomy. The system is balanced and is backed up on cold rainy days with a gas-powered generator. This system is modest by solar standards but resilient, the total cost was under R20 000.

Determinate negation[63]

- Solar power systems battery banks need to be closely monitored with ill-managed batteries quickly needing replacement. Mistakes are costly and can offset the financial viability of the systems.
- It is no use having solar panels that charge the batteries but have no use or capacity to utilise the excess energy generated during peak sunlight periods. Solar dealers claim an exact science when working out individual needs, but they tend to overemphasise production on cloudy days. Ultimately it was determined they overestimated panel requirements; my determinate experience proved that two 100-Watt panels are sufficient to cover our solar needs, in winter aspect and solar hours. Attempting to get solar power from sunless days therefore leads to imbalance, which is inefficient. A supplementary source of energy such as a generator is a better investment to alleviate this situation.
- Our determinate success regarding off-grid energy has meant adapting our lifestyle to accommodate reduced energy consumption rather than achieving self-sufficient autonomy. We still buy in liquid petroleum gas (LPG) and batteries need periodic replacement.[64]
- With solar power, one lives without municipal electricity bills, but the levels of utility are drastically altered. One's lifestyle changes to cooking outside on wood stoves and working on your laptop when the sun shines. These

[63] I believe that with experience and further development of our energy systems we will achieve a determinate negation of this negation; that is an affirmation of the starting thesis. However, to date, full energy autonomy is not realised.
[64] Budget constraints meant we kept our system as simple and small as possible. An integrated system utilising biogas, solar water heaters, solar electricity, large battery banks, and solar borehole pumps could ensure full autonomy but the cost means this is appropriate only through financing.

adaptations bring about a qualitative change to one's lifestyle that also requires one to be continuously aware of the energy one consumes.

Practical determinate truths (new theses, antitheses or syntheses)

- Shifting to low electrical solar usage induces a fundamental change to one's daily routine. Consequently, working, eating and sleeping patterns are altered according to a principle of optimal energy utility.
- This energy is however not free, expenditure on batteries being the largest cost. However, equivalent socio-economic households spend significantly more on grid energy then we spend on gas and batteries.
- The issue is not only insufficiency of solar power; it is also excess power. Excess energy production needs to be stored or put to work or else it is wasted.[65]
- Striking the correct balance between energy requirements and energy usage is the key to sustainable off-grid energy autonomy.
- A system designed to cover energy requirements, during low solar power periods, needs to have a utility value for peak solar periods. This point favours costly elaborate systems.

Key determinants confirmed

- Access to finance is critical, as the capital layout required for solar systems is high.
- Intermediate knowledge of energy systems will be required to set up a simple direct current (DC) system, whereas setting up an alternative current (AC) system may require the intervention or guidance of a technical person.

The determinate findings indicate that our energy expenditure has shifted from initially paying municipal bills (in the on-grid context) to investing in batteries tri-

[65] There is a lot of scope to creatively resolve this; refrigeration and water pump works well in our case.

annually (depending on type) and purchasing LPG gas on a bi-monthly basis. However, the off-grid lifestyle consumes far less energy by enforcing behaviour changes within new energy scarcity parameters. Life is different, perhaps harder, which is sometimes frustrating, but certainly, we find this life more natural and enjoyable. The reference points are now the sun, the seasons, the weather and the forest. Chopping wood for dinner and setting a fire under the stars are worlds apart from flicking the switch on a microwave oven and sitting on the couch in front of a television, with both these activities (chopping wood and lighting a fire) being agreeable necessities to providing a hot meal at the end of a day.

4.4.2 Harvesting biomass, is it viable and sustainable?

Theoretical aim and philosophy

Invasive trees are a huge problem as they invade sensitive ecological areas and water catchments; energy from biomass is thus a readily available resource available to poor people who need to offset high-energy costs.

Theoretical process

Knowledge on this topic was gleaned from the literature primarily papers by Dr Geldenhuys (2006, 2007, 2008) and attending lectures, notably a sustainable biomass module at the Sustainability Institute.

Theoretical problem statements identified

- Most invasive species coppice[66]; cutting them therefore makes them harder to remove later and does not kill the tree.
- The recovery rate of invasive trees is faster than indigenous trees so any clearing work is a temporary measure.
- Using poisons to kill the tree is harmful to the environment, especially near rivers.

[66] A coppicing species of tree will regrow from the newly cut stump.

- A chainsaw and a shredder are necessary to get the most out of tree biomass but these machines are energy intensive to operate.

Theoretical Thesis

Invasive trees can be harvested in such a way that most of the biomass is used and that the recovery of indigenous vegetation is facilitated without use of poisons. Sustainable rehabilitation of indigenous growth is not easily achieved because of the high seed banks and growth rates of invasive species.

Practical implementation, testing and problem identification

- Our plot was covered in wattle, so the first job was tackled on site. We used a saw and a pick (used to lever out the roots). I then started clearing the adjacent 200-meter stretch of river of the larger wattle trees as a first step. In riverine areas, the roots are stronger in order to brace against floods, so I altered my method to ring barking the trees and leaving them standing. The energy required to remove these trees from such difficult terrain meant they were not worth harvesting for biomass. When ring barking I experimented with a method of rubbing local species of mushrooms on the stump and wedging pieces under the bark. These fungi usually colonised and killed the tree. The follow-up clearing was maintained periodically over two years including the young wattles that were removed easily by hand and used as fodder for the goat kids.
- In the third year, the indigenous canopy had grown exponentially to provide shade and outgrow most wattle regrowth. Clearing wattle in existing indigenous stands is therefore an insightful way of overcoming the problem of wattle outgrowing indigenous trees. Rehabilitating existing stands of indigenous trees is thus a method of utilising nature to overcome the problem (Geldenhuys 2008). Further sections of the river, beyond the area I have

been working on, are still infested with dense wattle despite two rounds of the invasive removal programmes, which consists of cutting and poison-clearing campaigns. The last campaign in 2011 has had little effect.[67] Presently the regrowth of wattle is exponential and there is little evidence of success from what was a costly campaign. The most interesting determinate outcome is that trees I ring-barked with little effort were later on systematically removed by villagers looking for dry firewood.

- When large trees are destroyed, most of the biomass is left on site and the useful wood removed. Because I do not have a shredder, I developed a method for breaking down the smaller branches and leaves.[68] I pile the small branches over a hollow in the earth, with time the leaves fall off first and with the sun drying the wood, they rapidly become brittle. When we are in need of kindling a few months later, it is abundant and much easier to break up. Brittle kindling can be crushed easily in a wheelbarrow by compressing the twigs into the barrow. Left over in the pit, there is moist humus from leaves, which is ideal for mulching. In this way, the whole tree is used and the roots decompose underground improving the carbon content of the soils.

Determinate negation

- The original thesis was successfully affirmed and is superior to the *status quo* methods of cutting and poisoning, as depicted above. Furthermore, the potential for excessive biomass to be converted into dairy, meat and compost was originally overlooked.

[67] The Working for Water programmes, spearheaded by the then South African Ministry of Water and Forestry, had not intervened in Suurbraak during the time of my stay there. However, flood relief funding allocations were made by the National Treasury to Suurbraak in 2011. The ineptitude of such programmes in sustainably removing invasive species was observed then, as the elimination of invasive vegetation was not followed by the rehabilitation of indigenous species. Dr Geldenhuys paid our site a visit and echoed this view.

[68] In 2012, I employed my dairy goats in the de-leafing of the branches. In a single day, two goats will take the leaves off a number of branches of a large variety of trees. It is very interesting to me that the trees most needing pruning and removal are the species preferred by the goats, with few exceptions. Amongst exotic species, this includes wattle and pine (NB: eucalyptus is toxic to goats), and among pioneer trees, the species include rhus, bush-tick berry, karree and wild olive. The goats prefer this to their expensive purchased fodder. The result is cheap milk, cheese and meat.

- It is possible to rehabilitate indigenous vegetation stands easily (in their optimal habitat) to their natural state by clearing exotic species until a good canopy outshadows the new growth of exotic species.

Practical determinate truths (new theses, anti-theses or syntheses)

- Ring-barking trees is the easiest non-poisonous way of killing a tree. Fungus species that feed off wattle rubbed on to trees increases the chances of success. With these methods, coppicing is scarce.
- People can clear exotic species with little effort while selectively harvesting wood. Rehabilitated indigenous vegetation stands will suppress regrowth.
- All woody biomass can be utilised without the need of a shredder by using goats, the elements and time. Conversions from biomass to useful livelihood goods include leaves for dairy and meat; compost and mulch; twigs for kindling; branches for firewood, while roots left on the ground improve carbon levels in the soils.

Key determinants confirmed

1. Biomass harvesting can be a labour-intensive process, for the builder-owner or an external source of labour.
2. Space to stock and store (decomposing) biomass will be required.
3. One needs to allow time for the elements to process biomass.

4.4.3 Harvesting rainwater, is it feasible?

Theoretical aim and philosophy

The intention here is to utilise the available natural rainfall to the maximum benefit of home and garden in order to negate the need for costly municipal water.

Theoretical process

Literature constituted the source of the theoretical approach.

Theoretical problem statements identified

- Rainfall may not be sufficient to cover all domestic needs.
- Droughts will occur.
- Rainwater is not mineralised for drinking and will deplete the nutrient levels of the drinker (Coats 1996).

Theoretical thesis

By harvesting rainwater through roof catchment tanks, swales and dams, one can de-link from expensive (and often over-treated) municipal water.

Practical implementation, testing and problem identification

Our first structure was a 9x3-metre bungalow with a corrugated iron roof connected to a 500-litre tank. This tank was sufficient for all our domestic water requirements up until the drought of 2009, which is when we realised the limitations of the system and rainwater harvesting in general.

In 2007, a huge flood turned our land into a marshland with meandering rivers and springs all over the plot. It was by living through these events that I appreciated determinately the necessity of swales to direct water onto the land but also the need of swales to direct flow away from sensitive areas that were vulnerable to flooding. The flood gave me the opportunity to create a determinate drainage plan for excess water. For drinking purposes, we collected spring water but we could not access the spring during floods.

Before acquiring a gas water-heater for a shower, we had to bath in a nearby river rock pool using environmentally-friendly soap; this was certainly a challenge in the middle of winter but a pleasure on hot summer evenings.

The municipality supplies irrigation water for a flat rate of R40 per year. Growing food successfully and economically without this cheap irrigation water would have not been easy. After the 2007 drought, we acquired a 5 000-litre water tank, which we installed onto an additional 10x10-metre roof catchment area. Later this was doubled and complemented with a pump and elevated 1 500 litre tank, for pressurised water.

Determinate negation

- With reliable rainfall, water tanks are quickly recharged; however, weather patterns are not always reliable. The drought of 2009 continued for approximately a whole year with only a fraction of the annual average rainfall. One therefore needs a backup water supply because during droughts, even municipal supplies were threatened. (Backup water such as a borehole could remedy this and perhaps give one the autonomy to ride out even the worst droughts. This was not tested.)
- Swales and dams are not only important for directing water to dams for maximum retention but need to be designed to accommodate excess rainfall drainage away from the site to prevent flooding and water logging.
- If one wants to grow food with peace of mind, access to cheap irrigation water is probably necessary.

Practical determinate truths (new theses, antitheses or syntheses)

- Even though we live in a rainfall area with a year round average rainfall of 50mm per month, one still needs backup water supplies for dry spells.

- Swales and dams need to be designed for the dual functions of directing and retaining water on the one hand and on the other hand - in the event of excess rainfall - to direct floods away from the site.
- Additional cheap irrigation water is probably needed to cultivate food through risky drought periods.

Key determinants

- Access to finance to purchase capital-intensive water tanks is a pre-requisite.
- Sustainable water harvesting requires storage capacity, either in the form of water tanks or in the creation of hydro-catchment areas on site.
- Such an approach implies a high dependency on a specific climate, taking into account shifting weather and climatic patterns.
- Any rainwater harvesting technique requires a gradient to access the water without using power.

4.5 Managing one's own waste

This section on the management of our waste pertains to solid waste and water waste management, as well as sanitation, including both human waste and animal waste.

4.5.1 Human excrement, can it be managed safely at home?

Theoretical aim and philosophy

To manage household human excrement on site without the need for municipal grid sewage services.

Theoretical process

The final method adopted on this topic was gleaned from a literature review.

Theoretical problem statements identified

- Human waste is a taboo subject (Jenkins 1999).
- There are no national building guidelines for dealing with human excrement in this manner (South African Bureau of Standards 1990).
- Human waste can attract pests such as flies and vermin (Jenkins 1999).
- Human waste can smell bad.
- Human waste can leach into the underground water supply and cause pollution (Jenkins 1999).
- Human waste contains heavy metals, which can enter the food chain (Jenkins 1999).
- Human waste can contain pathogens and worms (Jenkins 1999).

Theoretical thesis

Human waste collected using a simple bucket system covered with sawdust and stored centrally on site can mitigate the problems listed above (Jenkins 1999).

Practical implementation, testing and problem identification

The principle is that, provided excrement is covered with an organic material such as sawdust – in the right carbon (sawdust) to nitrogen (excrement) ratio - then aerobic digestion (composting) is spontaneously achieved. I originally anticipated that my biggest concerns would be vermin and leaching. I therefore didn't follow the *Humanure Handbook's* recommendation of containing the waste in wooden packing crates (Jenkins 1999). Instead, I created chicken wire cages, which I positioned over mortar catchment areas (to act as evaporation beds). This was my measure to prevent leaching. I built two units for rotational purposes. As Jenkins forecasted, the system worked well resulting in the waste heating due to the action of thermophilic

bacteria. This initial composting process kills most pathogens by heat treatment (Jenkins 1999).

In my determinate situation, the waste, exposed to the Overberg climate and wind through the wire mesh design, dried out the waste rather than keeping it at the optimal condition of moisture content required for ideal composting. Certainly, there was no leaching problem and after only three months, there was no sign of the excrement, as it had, even under these conditions, fully composted down to a fine dust. Due to the issue of heavy metals, we did not use this compost on our food crops. Instead, we use it mostly for planting trees and on hedgerows.[69] Initially we experienced problems with flies because the sawdust that we used to cover the 'humanure' (Jenkins 1999) wasn't sufficiently fine.[70]

Determinate negation

The resulting fly infestation was enough of a serious problem to negate our choice of toilet system.

Practical determinate truths (new theses, antitheses or syntheses)

Flies are a big problem when composting human excrement if the cover material used is not fine enough to prevent them from getting to the human manure.

New practical problem statements identified

- Flies reproducing in the compost pile.
- Issue of compliance with the South African Bureau of Standards.

[69] There is literature by Gunter Pauli (2010) indicating that earthworms remove heavy metals from compost. Spirulina is known to remove heavy metals from water. Further research in this regard could unlock a solution to the heavy metal issue, but all this begs the question: should we not be more concerned with how these pollutants are primarily entering our food systems? Living off the land in the first place, with lesser ingestion of processed products that contain heavy metals, is certainly an antidote to heavy metal pollution. Comparative scientific studies in this regard would be most interesting.

[70] Using leaf litter as a cover seems to facilitate a fly maggot problem.

New thesis

Flies cannot reproduce if the compost is isolated in a breathable fly-proof container that allows the compost to decompose aerobically.

Practical implementation, testing and problem identification

I started a new compost collection procedure in wine barrels fitted with a drain hole near (but not at) the bottom. The raised hole provides a sink function preventing leaching but also ensures that in heavy rains the compost does not become waterlogged and anaerobic. The top was covered with shade cloth tied down to prevent flies entering the waste, but with this system, flies were again somehow being attracted. I realised I needed better compost cover material, to ensure the flies would not be able to reproduce in the human manure.

I struggled with this problem, as I was unable to think of the right solution. One day while emptying an already composted, human manure barrel I realised that the composted material was sufficiently fine and of breathable consistency and therefore the ideal cover material that I had been trying to identify. I sensed this to be a determinate solution to my problem.

Determinate negation (affirmation of original thesis)

Using composted humanure as a cover material prevents flies from breeding in the compost. The fine consistency of the material locks in bad odours, prevents flies from entering the material and remains breathable for aerobic composting.

Practical determinate truths (new theses, antitheses or syntheses)

- Re-using composted and dried human manure as a cover material for human excrement in both the bucket toilet and the compost pile is a great method of running a composting toilet system.

- The superior consistency of the composted material prevents odours and flies.
- The material breaks down more easily than when fresh sawdust is used.

Key determinants

- The quality of the cover material is key to ensure the right carbon to nitrogen ration and neutralise any smell and fly infestation
- Process control: One needs to control the process of dry compost systems attentively; it remains a very low maintenance and environmentally-friendly system.
- Laws and regulations are a key hindrance to the usage of this system and need either to be circumnavigated with the pretence of there's no ban on composting or failing this following regulations by digging out a conservancy tank, or they need to be challenged with the required scientific evidence and political connections.[71]

4.5.2 Grey water, can it be managed in an environmentally-friendly way?

Theoretical aim and philosophy

The aim was to find a way of reusing grey water without polluting the garden.

Theoretical process

The theoretical knowledge building of this section was based on periodic reference to literature.

[71] Challenging municipal regulations concerning dry compost toilets would constitute a very interesting area of research, addressing not only human waste management issues, but also issues of soil nutrient depletion in the global African context.

Theoretical problem statements identified

- Most cleaning products contain chemicals, which are pollutants.
- Any pollutant used in the household water will enter the ecosystem.
- Soapy water spread on the garden will accumulate pollutants on the surface topsoil.

Theoretical thesis

It is possible to reuse grey water in the garden without polluting the topsoil if one restricts one's use of cleaning products to biodegradable environmentally-friendly brands. In this way, grey water can be used in an orchard to irrigate fruit trees and produce crops.

Practical implementation, testing and problem identification

We realised we had to stop using any product that contained chemicals as we did not want these substances in our backyard ecosystem. Everything from shampoo to toothpaste had to be organic and biodegradable.

My initial intervention was to dig a deep well into the clay soils. The idea was that grey water filtered through a vermiculite bed before entering the well would soak up the grey water into the substrata soils and filter out the solids in the process. I envisaged occasionally cleaning up the sludge. In practice, the system did not really work as intended although the water did seep out into the clay. Eventually, however, the concentration of soapy pollutants would start to smell. Sometimes we noticed livestock went missing and we would invariably find them unhappily wallowing in our grey water pit.

Determinate negation

Grey water, even if it contains no harmful chemicals, can become a noxious mixture if allowed to concentrate in a confined location such as a dam.

Practical determinate truths (new theses, antitheses or syntheses)

Grey water will concentrate and begin to smell if the source overcomes the ecological sink. The emphasis should shift to creating a robust ecology that can handle the domestic loads of grey water.

Theoretical problem statements identified

- Identifying plants that can survive in polluted grey water conditions.
- Concentrated grey water in a single location is not conducive to ecological life.

New theoretical thesis

If grey water is diluted and filtered to a concentration consistent to ecological life, then it can be recycled successfully.

Practical implementation, testing and problem identification

I created a system, which worked as follows: grey water is filtered through shade cloth and a vermiculite straw bed. Birds eat the food solids, which collect on the shade cloth net. The filtered water then flowed into a mini-wetland built on a mortar bed. The mortar bed is in a fanned shape covered with stones in which river plants are propagated, thus creating a vertically integrated pond (Horn n.d.). The roots and stones and the fan design of the wetland cause the grey water to deposit its solids (Coats 1996).

I also built a fountain feature that utilised harvested rainwater from a catchment tank. This fountain permanently trickles into the wetland system. This has a double purpose of diluting the grey water to a consistency conducive to plant growth as well as keeping the helpful bacteria and plants alive (the water trickles into our tree orchard) when no grey water is being produced, for instance at times of absence from the dwelling. Finally, the diluted and filtered grey water enters the soil as it flows into our orchard topsoil.

Determinate negation

- Even a good ecological wetland system has a source and sink threshold. The system's success is therefore ultimately dependent on this not being exceeded.
- The resultant grey water is certainly not as good quality as normal irrigation water. If clean irrigation water is available, it is probably preferable to divert grey water away from food crops and use it to grow biomass for building and fuel, such as bamboo and fuel wood trees.

New theoretical theses

- Grey water can be piped underground in large diameter seepage pipes where it can be used to grow non-food utility forest biomass.

Practical implementation, testing and problem identification

Grey water is diverted through a net filter into an underground pipe laid in sandy well-drained soils. We have prolific tree growth, it remains to be seen if root infiltration will be a major problem or benefit.

Practical determinate truths (new theses, antitheses or syntheses)

- Diluting grey water makes it more conducive to beneficial life and less likely to tip the source and sink balance.

- Wetland shape dictates the flow of the grey water and the deposition of solids.
- Plants that are fast growing, water tolerant and non-edible are a better way to lock up the water into utility functions. For instance trees/bamboos that can also be used for firewood, building or fencing poles. It is preferable to divert grey water to these areas if alternative water sources are not a constraint.

Key determinants

- An available water supply is required to dilute and cleanse grey water.
- The nature of the cleaning products used will greatly affect the quality of the grey water and the downstream sinking capacity.
- One needs to balance out source and sink.
- Any waste water system requires process control.

4.5.3 Barn waste, can it be productively utilised?

Theoretical aim and philosophy

To balance our need for compost to grow food with that of our livestock production of manure.

Theoretical process

The literature consulted and the lectures attended formed the basis of the theoretical approach in this section.

Theoretical problem statements identified

- There is very little room available for extensive animal shelters on a small piece of ground.
- Small livestock produce small amounts of waste, which is labour intensive to collect and process into compost.

- Sick animals could pass on diseases across species in inter-species barns.

Theoretical thesis

Containing all livestock in a single barn at night protects them from predators and makes harvesting of (thus concentrated) manure a simple process.

Practical implementation, testing and problem identification

The challenge was to build a small multifunctional barn that could accommodate rabbits with indoor and outdoor free roaming but deny them access to the larger surroundings. Geese, chickens with laying boxes, ducks and goats also needed to be accommodated.

The barn worked well except for conflict between alpha males of different species. The billy goat was prone to headbutting the drakes and the drakes were prone to assaulting the gander. These problems had determinate impacts. For example, the danger of predators failed to outweigh the danger anticipated in the barn thus leading to management glitches that made it difficult to get the geese into the barn at night.

In the end, manure was easy to harvest but herding was required to get all the livestock into the barn. Chickens perched out of danger so the inter-species compatibility problem was confined to the ground. After initial skirmishes, the pecking order was established and the livestock went to sleep. In the end, we allowed the geese to remain outside as they were good for raising the alarm and because we had a dog able to defend them from predation.

Determinate negation

- A good understanding of one's livestock politics is necessary in order to design a happy but compact and multifunctional barn.

- Chicken droppings falling from above onto other livestock and into food and drinking troughs poses a health hazard.

Practical determinate truths (new theses, antitheses or syntheses)

- A multifunctional barn is possible because domestic animals appreciate routine and are used to living with each other; however, without separate enclosures, interspecies conflict is a significant drawback.
- Provision therefore needs to be made for irreconcilable inter-species compatibility dynamics. Animals will certainly not nest in a site where they feel threatened.
- Animals not cooperating with the evening procedure (of returning to the barn) are an indicator that some form of harassment is taking place in the barn.
- A flat and easy to clean floor preferably made from mortar of good moisture absorptive qualities such as cob is ideal for cleaning and collecting manure.
- Large livestock are not necessary to produce an adequate compost pile for a food garden. A small livestock barn will collectively produce a diverse and adequate amount of manure for a healthy vegetable garden. For hygienic reasons it is better to keep dairy livestock in their own enclosures.

New thesis

At night, contain livestock in separate, purpose built enclosures placed to ensure easy access to forage areas and minimise complexity.

Key determinants

- Space for a barn on one's ground
- Zoning regulations and other municipal by-laws regarding the keeping of livestock
- The types of livestock farmed

- Training of livestock.

4.5.4 Solid waste, can it be mitigated by producing and processing food at home?

Theoretical aim and philosophy

The aim was to reduce our solid waste to a minimum by producing on site most of our needs from organic sources.

Theoretical process

Continuous ideas for substitution were gleaned from multiple sources.

Theoretical problem statements identified

There are no local recycling stations.

Theoretical thesis

By producing and harvesting most of our own domestic needs, I can significantly reduce the amount of solid waste produced.

Practical implementation, testing and problem identification

Although we were producing our own vegetables preserves, meat and were self-sufficient in dairy, eggs and beer, all our domestic needs were not met. All grains, feeds and miscellaneous products needed to be bought in. We did therefore produce a small shopping bag of domestic waste each week. However, many of the bought-in containers and bags were reused as receptacles a few times on site before being discarded.

The building process produced additional waste, even though most of the materials were local. Development processes however pertaining to the overall infrastructure produced a lot of waste, all of which was dumped in the municipal dump.

Determinate negation

The building project combined with the small amount of waste from products brought into the homestead such as grains, feeds and miscellaneous goods produced a significant amount of waste that ended up in municipal landfills.

Practical determinate truths (new theses, antitheses or syntheses)

Producing food on site results in significant reductions in waste, re-using containers for on-site utility purposes increases domestic savings through a substitution effect (producing dairy products means there is usually a shortage of such containers). However, infrastructural development, such as building practices, produced a significant amount of waste that was not originally anticipated.

Basic legal, economic and physical systemic blockages

A local resident of our village started a recycling business from his property, but was ordered by the municipality to shut down as he was not licensed to recycle and the residential zoning rules did not allow recycling operations.

Key determinants

- The variety and quantity of products that are produced on site
- Developmental and consumable inputs
- Rules and regulations.

4.6 Conclusion

This chapter has attempted to detail, in a crude pointed fashion, a process of determinate negation, as linked to learning from and in systems. In so doing, it is an attempt to illustrate the importance of grounded practical research. Many problems identified with alternative livelihood approaches, such as niche settlement, cannot be apprehended with quick generalised theoretical analysis. Critical solutions are hidden in the detail at the microcosmic context level. They are determinately disguised requiring a methodical, rooted approach that takes not weeks, not months, but years of research.

Chapter 5 concludes with a discussion of the niche settlement approach from the broader municipal rural settlement perspective, with Suurbraak used as the focus. The chapter was written with a view to seeing if these specific niche settlement determinants (gleaned and listed above in this chapter) are facilitated by the larger context.

CHAPTER FIVE: Conclusion

The literature analysis (chapter 1) discusses the global 'food regime' with particular emphasis on the systematic poisoning of our environment, highlighted in the selected research literature. The purpose was to illustrate that the 'third food regime' (Swilling & Annecke 2012) results in the consumption of food of doubtful origin. The analysis also pointed to the fact that underpinning the regime is a fossil energy regime confronted by the looming spectre of 'peak oil' (Almeida & Silva 2011, Jason 2011, Swilling & Annecke 2012).

Based on my research during the Bachelor of Philosophy degree component of the course, I hypothesise in chapter three what a viable rural settlement alternative to a world subjected to the above global 'regime' could require and/or entail.

In the same chapter, I document a research road trip through the Western, Southern and Eastern Cape, in search of surviving examples of successful small-scale farming operations broadly aligned with the niche context, as well as conducting an agrarian land-use survey in the village of Suurbraak. As a result, I produced a list of seven key determinants pertaining to small-scale farming.

In chapter 4 I looked at our own niche, off-grid, small-scale (0.1 hectare) self-sufficiency operation in Suurbraak, and - using the four hypothesised principles discussed in chapter three as a basis – I systematically tested each of our own interventions using an application of Hegel's determinate negation concept. My interventions were thus systematically tested on the land, through a process of negating my original assumptions. In this manner, I unearthed deeper insights that culminated in a further and more comprehensive list of determinants deemed personally applicable to the 'niche' settlement context mentioned above.

In this chapter, armed with a deeper understanding, I intend discussing how the findings at the microcosm (our own 0.1 hectare niche farming operation) relate to the

Suurbraak community as a whole, with a particular interest in the regulations that govern the community, to establish whether the prevailing legislation facilitates or impedes a 'niche' settlement approach.

5.1 The microcosm: interventions on a small plot of land

This case study investigation was conducted using Hegel's concept of determinate negation to help establish, for each sub-heading, the extent to which our on-the-ground experience unearthed real affecting or operational determinants. Where problems arose with interventions, the process of determinate negation, on the most part, allowed these problems to be ironed out. This strategy therefore allowed me to generate a list of ancillary determinants that were deemed crucial with respect to the adjusted and functional interventions operational in the case study.

Table 4 captures the macro-level (left columns) and micro-level determinants (right column).

Table 4: Macro-level and micro-level determinants

Determinants operating at the macro-level (chapter four)		**Ancillary determinants operating at the micro-level (summarised from chapter five)**
1. Land zoned for rural subsistence	2. The farming allotment is large enough to be considered a smallholding or put to agricultural use (> 0.1 hectare).	Access to barn and storage space as well as facilities. Space to stock and store biomass. Water storage capacity. Variety and quantity of products produced on site.
	3. The homestead is on or near the farming allotment.	Available land close to the homestead. Protection from pests (exclusion zones and farming techniques). Access to kitchen facilities and water.
	4. The farming allotment has access to cheap irrigation water.	Irrigation water.
	5. Access to inputs: primarily access to commonage and/or feed.	Gathering: access to land (private and wilderness). Access to: extensive grazing (ideally proximate or supervised) and/or fodder. Quality cover material for composting toilet. Cleaning products used in grey water. Developmental and consumable inputs.

	6. A source of manual labour and wage income is available.	The creativity (and will) to transform the materials with available tools and resources. The finances available. Local knowledge building. Process control of systems on site.
	7. To maximise income potential, there should not be overly restrictive and costly laws and regulations stifling possible activities and market access.	Community access (availability) of primary resources, particularly forest products. Community harvesting rights, including non-timber forest products. Laws and regulations for composting toilets. Zoning rules and regulations applicable to livestock farming. Recycling rules and regulations.
	7. Other.	Exposure of organic materials to the elements. The materials' embodied mechanisation. Plant knowledge. Access to basic specialised equipment for beer brewing. Time for the elements to process biomass. Climate. Fall (gradient) for harvesting rainwater. Source and sink. The types of livestock farmed. Training of livestock.

The arrangement of the determinants in Table 4 suggests that with necessary adjustments, alignments and/or tweaking, the macro-determinates are translatable and therefore applicable at the micro-level on many attributes associated with the case study and are therefore theoretically defensible and sound.

In this chapter, selected determinants from chapter four, considered crucial to the model, are discussed in more detail. A determinant was deemed crucial if in its absence no adequate substitute would remedy the situation. Each component section opens with a table listing the micro-determinants from chapter four followed by a brief discussion of a few determinants from the list. The components forming the overarching framework of this analysis are the same critical aims identified in chapter 4.

As the model flows from a particular instance, it will necessarily be context specific and discussed as such. The ensuing discussion will also attempt to identify more generalised principles that have universal applicability.

These points are discussed before focusing on the model as a holistic livelihood enterprise.

5.1.1 An owner-built house using local materials

Table 5 below captures the key determinants identified at the micro-level applicable to building a house using local materials. Each of the interventions on site is discussed in the light of these determinants.

Table 5: Determinants for self-construction using local materials

Intervention	**Key determinants identified at the micro-level**
Using local materials.	Community access (availability) of natural resources, particularly forest products. The materials' exposure to elements.
Using industrial products.	The materials' exposure to elements.
Using mechanical equipment.	The materials' embodied mechanisation or the scope of materials available. The creativity (or will) to transform the materials with available tools and resources. The finances available.

Discussion

The above-listed determinants are applicable to the utility for an owner-built home using local materials. However, the over-riding determinant is conditional upon **community access and availability of natural resources, and particularly forest products.** Why is this determinant more crucial than the others listed?

The other determinants are relatively easily realisable through a variety of means and substitutions but the access issue is uniquely different. This refers to access to the types of materials available near the actual site such as, in our case, forests of invasive exotic utility trees such as wattle, pine and blue gum that would determine a wooden structure; the availability of stone that would determine a stone structure and

the availability of clay, straw and water to make cob or adobe structures viable. Although it can be argued that this is a rather obvious research outcome, my experience has been that this basic determinant is subverted by legislation.

For instance, the Swellendam SDF applicable to Suurbraak emphasises the maintenance of the village heritage. However, there is no follow through of SDF-stated intentions into the actual zoning regulations applicable to the local landscape (see appendix 2: letters to Swellendam Municipality), as well as in other relevant legislation (such as forestry and commonage legislation), in that the very determinants responsible for shaping this heritage in the first place are unacknowledged, undermined and/or disrupted. In other words, access to and use of the very raw materials that were initially used to build the cottages in the 19th century in Suurbraak (I call this heritage building practices) is restricted.

To elaborate on a little of this contention, it has to be mentioned that gates, at the time of the research, had been erected on the access road into the forest. This situation could only have been allowed to develop because heritage links with the past are not adhered to fully. This reality has grave consequences in that like-minded people who want to build and live in tune with the heritage of the valley are prevented from doing so, in preference to developers who are endorsed by legislation to build homes from concrete and glass.

The point being emphasised is that if we lose touch with the true determinants operating within a rural niche context, distortions could emerge in the overall system, which further undermines the traditional heritage of the village. In the case of our dwelling, we would need to earn sufficient income to purchase substitute materials that would then need to be transported over large distances.[72] In such a situation, as pointed out above, building becomes the privilege of the wealthy. This then

[72] Planners responsible for engineering these factors are obviously not factoring peak oil into the equation. Even taking the most optimistic peak oil scenario, this situation will not offer protection to these homesteads 50 years from now.

introduces a new social economic dimension, whereby the poor and unemployed justifiably could become apathetic, not being able to keep up with the wealthy 'Joneses'.

The access (or lack thereof) to local building materials also has environmental implications. When and where the natural harvest of invasive biomass is prevented, invasive forests will choke from overgrowth, with a resultant drop in the water table and water catchments (Coats 1996). Dry forests are more vulnerable to fire, thus fire becomes the key determinant for control (Geldenhuys 2007). Finally, people's natural links to a particular resource would end. Once this link is severed, the ancestral heritage techniques utilised run the risk of being altogether forgotten.

In the case of Suurbraak, a pattern has emerged whereby the majority poor, who can ill-afford to buy in building materials, harvest sand from river levees. This is damaging to the riverbanks. From observations I have made, I believe it to be a contributing factor to the breaking down of natural flood levees, the undercutting of the riverbanks and the cause of downstream erosion of agricultural land.

Access to river sand therefore highlights the importance of a determinant with negative impacts. In such cases, access to primary resources is justifiably restricted. However, restricting access to a determinant does not change the reality of its heritage value to the village context. The determinant - access to sand - has linkages with the others such as timber, clay for brickmaking, etc. As such, the banning of timber harvesting, combined with a shift to other types of buildings materials, such as cement rather than traditional building materials, compounds the shift away from the village heritage paradigm. Put together, these trends combine to put additional pressure on exploitation of river sand, as the proportion of sand used within the entire structure increases significantly when cement is used as a preferred building material. The ratio of sand to cement in a conventional structure is 3 to 1 whereas with clay bricks, clay is the primary ingredient

If this reasoning is sound, then in the case of Suurbraak, access to clay and sand (preferably not river sand) for bricks and timber is pivotal to protecting the heritage of the village. Low-cost RDP-style cement block-houses represent the antithesis of this paradigm. It is grossly misleading to claim that there is community access to resources in IDP and SDF documents when there is actually no legal provision for this in terms of zoning regulations, which stipulate land use provisions, or in terms of other legislation. Community access to resources should be built into relevant regulations at all levels and all these plans and regulations should be coordinated. In this regard, refer to appendix 2 and the following extract from municipal response letter dated August 2012: “Reference in the Municipal Spatial Development Framework to natural resources refers to the access of the broad communities to land and water...” (Nell 2012). But if so, then this constitutes a restricted access that doesn’t mirror the SDF that promises the following: “Natural resources could be used, harvested or extracted, if and only if such use/harvest or extraction is compatible with the area and would be sustainable” (Swellendam Municipality 2008: 31).

What has been encouraging so far is that the key roleplayers in the Swellendam Municipality are themselves aware of legislative contradictions and open to discussion. Much is at stake not only for our off-grid rural niche context but also for the valley as a whole and its rich heritage that everyone is keen to uphold. It is therefore incumbent on all of us to find ways in which key determinants for sustainable rural development are acknowledged and can inform these official documents, which are template-driven and written up by outsourced consultancies with little determinant knowledge. (The consultancy responsible for drafting the SDF is Urban Dynamics; their work has the potential to fundamentally alter the rural dynamic in Suurbraak.

In summary, if one wants to stimulate heritage precedent, municipal laws and regulations need to explicitly facilitate community access to the range of natural resources deemed applicable to the heritage precedent.

5.1.2 Producing one's own organic food, beverage and managing personal primary health with the use of medicinal plants

The determinants that crop up repeatedly with the livelihood activities listed are access to water, access to land in proximity to habitation and access to primary inputs (primarily feeds and/or commonage grazing) (see table 6). If one of these determinants is missing or negated, the whole system - which is by definition integrated - would necessarily break down.

Table 6: Determinants for self-production of food and beverage and managing personal health

Intervention	Key determinants identified at the micro-level
Growing enough supply and variety of produce.	Available land close to the homestead. Protection from pests (exclusions zones and farming techniques). Irrigation water. Local knowledge building.
Healing with plants.	Access to land (private and wilderness). Community harvesting rights. Plant knowledge.
Producing free range ethical meat.	Access to barn and storage space and facilities. Access to extensive grazing (ideally proximate to habitation or supervised by shepherd) and/or fodder. Access to kitchen and water.
Producing free range ethical eggs.	Access to land proximate to habitation (private and wilderness). A barn (shelter, storage). Access to forage and/or fodder. Access to water.
Producing free range ethical dairy.	Access to land proximate to habitation (private and wilderness). A barn.

	Access to forage and/or fodder. Access to water. Access to kitchen, heating and basic utensils.
Making home-brewed beer.	Access to inputs, grains, water, fuel. Access to basic specialised equipment.
Making dairy products.	Access to inputs, forage, water, fuel. Access to basic specialised equipment.

Discussion

In the case study, access to water took three forms: firstly, harvesting rainwater for domestic use; secondly, harvesting spring water for drinking; and thirdly, tapping into cheap irrigation water for growing food[73]. Suurbraak has a luxuriant annual rainfall pattern and despite this asset, most villagers without access to irrigation water do not cultivate crops (refer to the Suurbraak survey in chapter 3). There are exceptions to this rule. Some older farmers grow food for the home quite successfully by relying on rainfall only. I believe this must be attributed to their extraordinary level of expertise and local knowledge. Most of us that cultivate crops consider the availability of cheap irrigation water a precondition to justify going out and tilling our soils. This was especially true following the 2009 drought, which affected us all adversely and caused incidents of greed and conflict amongst farmers who were using an increasingly scarce resource.[74] A farming system can survive without irrigation water; in such cases, people would emphasise livestock production on their land (providing the stocking rate is appropriate for the water availability with regards herbaceous growth and for drinking). Regardless, water remains the key to evolving towards an

[73] In Suurbraak, the irrigation water is accessible to only some households at a low cost, however the way the irrigation system was designed makes it costly for the municipality. A huge amount of electricity is used to pump the water from the Buffeljags River to a mountain reservoir, despite many mountain streams in the vicinity that could easily be gravity fed to keep the dam full. The system is therefore deemed quite inefficient, although it is proving effective in providing the service.

[74] Although it is locally a determinate possibility to grow food with rainfall alone, I believe that looking at the evidence of who cultivates, one can generalise and consider access to irrigation water a true determinant to food cultivation patterns on a homestead scale. This would be especially relevant if generalising over a South Africa-wide climatic context where dry desert bio-zones are not always conducive to cultivation. Providing adequate water soil stabilisation with thick mulching can make soil transformation a distinct possibility (Mollison 1991, Coats 1996, Jenkins 1999, Devlin & Zettel 1999, Rosenberg & Linders 2004, Fukuoka 2008).

integrated farming model that produces most household needs from dairy, meat, eggs, fruit, vegetable and beer.

The second key determinant is access to land proximate to habitation. This can be broken down into three key areas. The first is access to intensively-farmed private land. This is defined as land that legally belongs to a family (incentivising progress through development investment) and that should be large enough for intensive farming practices, such as stabling and cultivating subsistence crops under 24-hour supervision. The second pertains to infrastructure development. Habitation in this view is more than a block RDP-style house. It also implies basic storage facilities for grains, bales and tools, shelter for livestock and paddocks and fencing for control as well as protection (refer to chapter 3: research road trip questionnaire summary). The third is access to extensive grazing or village commonage. This allows livestock - whether it is a chicken roaming on the street kerb or a herd of goats grazing on marginal bush lands – the natural freedom to participate in village life in a manner that is truly applicable to domesticated livestock's important value in rural village life, as well as to the animals' true nature as extensive foraging creatures. I must emphasise here, concerning this determinant, the importance of the 'proximate' notion. Many people have land but because it is far from the homestead, land is usually left fallow or cultivated unsuccessfully or used to grow fodder or for grazing.[75]

The third determinant is access to inputs, in particular feed grains and feed straw. In the case study, I emphasise the incredible diversity of activities the homebuilder-owner/self-sufficient farmer carries out throughout the day. In my case, days are spent harvesting biomass, building, making cheese, brewing beer, baking and tending to livestock and food gardens. In addition to this workload, one is confronted by significant constraints: land is limited in size, commonage forage areas are

[75] I believe many state-sponsored small farmer initiatives related to land reform overlook the 'proximity' determinant, by granting land to farmers on the outskirts of villages. This often results in immediate failure. A case in point is a costly ¼ hectare vegetable project (Suurbraak erf 166) initiated by the Department of Agriculture in Suurbraak, left abandoned and derelict. The last farmer left after being denied the opportunity to live on site (irrigation equipment, rotavator, green house, storage facilities and electric fencing all left in ruins because this determinant was not addressed).

stocked with other homesteaders' livestock and it is often dry marginal land. Climate variability means that dry spells immediately affect available grazing and therefore livestock health. Buying or bartering for primary input feeds, combined with the storage of these items, gives the system a little more resilience to survive adversity.

Firstly, it allows for the importation of nutrients from large-scale farms, which produce the grains and straws, onto your own land, thereby boosting nutrient levels for food cultivation. Swilling & Annecke in *Just Transitions* (2012) emphasise the soil nutrition issues facing farmers globally, particularly nitrogen, potassium and phosphate (NPK). It is therefore logical that these soil depletion issues have ripple effects into the nutrient quality of animal hay. Feeds for animals require a broader spectrum of mineral composition in order to maintain livestock health. Globally, feeds are showing signs of deficiencies with respect to the whole spectrum of minerals normally found in these feeds (Coleby 2001). At any rate, bringing feed in is a good idea, since by importing nutrients - in whatever form - into the local ecosystem, one is giving back rather than taking away from the soil, which on a micro-farming scale can have very positive effects. However, an unmeasured and potential unintended effect of such an approach is the importation of chemical pesticide residues. For instance conventional farmers are known to control weed invasion around their crops with the Monsanto 'Roundup' product; to what extent are such residues to be found in the biomass we thus bring in so enthusiastically? This might not be the case in the unlikely event that one finds a truly organic supplier. If not, one cannot claim to be truly organic.

Secondly, storing these inputs on site is a buffer for adverse climatic events, for instance, on rainy cold days, when it is better to keep animals in the stable. It is also true for drought periods, when grazing is limited and one would otherwise be forced to sell livestock onto a buyer's market, as occurred during the 2009 drought.

Having said all this, I want to emphasise that I would not want construed from the above that all these infrastructure inputs should be laid out in town planning and top-

down developmental projects. I rather suggest that if access to the determinants is facilitated, then the rest will emerge spontaneously. One must look behind the larger description and separate the essential from the emergent: building RDP-style houses would, according to this argument, be a misallocation of resources and it would be better to focus resources on proper zoning parameters, irrigation schemes, communal grazing lands, forests, packing and processing facilities, market development and infrastructure extension.

My research with small farmers suggests that if a hypothetical villager acquires, by hook or crook[76], a piece of land with secure tenure, large enough to live on and to farm, and providing s/he is connected to irrigation water of some sort, as well as having some means for accessing primary inputs, then all these combined determinants should spontaneously and necessarily evolve into some form of agrarian livelihood. With time, the land will be developed to optimum individual utility.[77] I am not necessarily claiming this is realisable in the time frame of a decade; however, it is essential to project how development should occur over a period of 50 to a100 years (hence the focus, in chapter 1, on peak-oil literature). These developmental processes are emergent and dependent on skills, creativity, work ethic and, most importantly, on the determinants being in place in a holistic and historically appropriate manner. One can certainly wager that a house will eventually be built, paddocks and vegetable garden will appear, and a farming livelihood will emerge (this model was common to farmers questioned on the research road trip: chapter 3).[78] I am therefore suggesting that understanding the following key determinants is a means to unlocking sustainable livelihoods over the longer term.

[76] Access to leased farmland is fiercely contested, often falling into the hands of a handful of village elites who have the most power and influence. The committee members responsible for allocating commonage resources are themselves farmers and beneficiaries of commonage land, which is thereby in many instances 'self-allocated'.
[77] If, in fact, the determinants are correct.
[78] If this does not occur, then this would be due to other forms of livelihood or income-generating activity being preferential. However, I believe agriculture would be the default choice. This is the trend indicated in Suurbraak where only 1% (See chapter 3 survey results) of such households use their land for non-agrarian livelihood activities.

If one wants to stimulate rural agrarian livelihood activities, the following determinants need to be in place and reinforced: access to irrigation water, access to land in proximate to habitation and access to inputs (primarily feeds and/or commonage grazing).

5.1.3 Harvesting one's own energy and water

The key determinants identified here are resource availability, capital and scale (see table 7).[79]

Table 7: Determinants for harvesting own energy and water

Intervention	Key determinants identified at the micro-scale
Solar power.	Finance. Knowledge building.
Wood fuel.	Labour. Space to stock and store biomass. Time for elements to process biomass.
Rain water harvesting.	Finance. Storage capacity. Climate. Fall (gradient).

Discussion

This is particularly relevant for water harvesting and solar electric systems that require costly industrial materials in production. Without sufficient capital to implement proper systems (that need to be scaled appropriately for resource availability and household needs), the utility of the system comes into question. In the case of solar power, a too small battery bank leads directly to reductions in battery life. In the case of water collection, having little storage means a discontinuous supply. In the case of wood, harvesting biomass requires enormous energy and some form of transportation or labour. A handsaw, donkey cart or

[79] Scale and finance can be considered proportionally related.

wheelbarrow constitute a simple solution but the latter, in particular, does not deliver much wood to the household.[80]

These considerations are best analysed from a systems' point of view, as the interventions are systems. If investments are required, then an accurate analysis of the scale determinant needs to be well understood. If the village suffers from unemployment and poverty, then capital outlays for solar power systems are perhaps not the most viable option to supply poor householders' energy needs, nor would expensive grid energy be appropriate if incomes are low. Harvesting biomass by employing the unemployed, the donkey cart and the control of invasive trees should, I believe, necessarily become the mainstay of an energy system (where wood invasive forests are abundant this can enhance conservation), despite reservations on some of the other issues surrounding biomass.[81]

This is not to say solar and water harvesting are inaccessible. Investing in a large sheet of plastic, digging furrows and dams are cost effective methods to ensure the harvest and storage of water. A long irrigation pipe coiled and left in an insulated ceiling can serve as a very effective solar heater. These sorts of low-cost creative solutions pay off the initial investment very quickly. With regards solar electricity, knowledge is the over-riding determinant, as an ignorant practitioner can ruin a battery bank of any scale. **If one wants to stimulate the harvesting of alternative energy and water, the following determinants need to be in place: relative availability of the resource in question; relative capital/labour requirements to harness the resource; and the scale required in order to secure the appropriate utility.**

[80] Most Suurbraak residents carry wood by hand to their homes.
[81] I have not bought into the Western lobby campaigning against the poor huddled around their hearths, in that the campaigners themselves do not have a relatively moral high ground to back up assertions against such humble low-impact livelihood strategies.

5.1.4 Managing one's own waste

The key determinants discussed here are laws and regulations, process control, source and sink, and diversifying home production.

Table 8: Determinants for managing one's own waste

Intervention	Key determinants identified at the micro-scale
Human excrement.	Quality cover material. Process control. Laws and regulations.
Grey water.	Available water supply. Cleaning products used. Source and sink. Process control.
Barn waste.	Space for a barn on one's ground. Zoning rules and regulations. The types of livestock farmed. Process control (training of livestock).
Solid waste.	The variety and quantity of products that are produced on site. Developmental and consumable inputs. Rules and regulations.

Discussion

Laws and regulations governing small parcels of land are critical to these listed sustainable practices. Small pieces of land are usually zoned residential, which is the most restrictive zoning regime. The government guidelines informing the content required in municipal IDPs and SDFs define "access to resources" as access to municipal services: water, sewage, electricity (Department of Environmental Affairs and Development Planning 2005). If we are to accept such a narrow definition of term 'resource', the outcome could have ripple effects into what is actually legally possible in terms of sustainable livelihoods in a resource-scarce future; the niche settlement approach would certainly not be a livelihood option.

Firstly, the issue of access to other resources is not addressed (our household doesn't utilise any of these municipal resources but certainly relies on resources!)

and secondly, there would be no categories for the alternatives to municipal services relevant to this discussion. In light of current regulation and practices, our waste management systems are therefore not an option.

A similar problem with phraseology and/or definitions was highlighted by the 2011 Census (our census reference: A1892203828) in that the questionnaire did not make provision for categories dealing with most of the systems we were using. We had to give negative answers when asked whether we had access to or owned tapped drinking water, electricity, sewage system, fridge (at the time we were utilising a clay pot as a fridge), landline, television set, washing machine, flush toilet. This would no doubt qualify our household as extremely impoverished, which is ironic considering that we feel the exact opposite. We enjoy a resilient, qualitative and resource-wealthy on-the-ground reality.

The process of unearthing or identifying determinants is in itself determined by knowledge and experience. Organic materials, over time, will decompose, but knowledge is required to be able to facilitate processes that are conducive to recycling manure close to the home. For instance, if flies are considered a core problem, then manure must be covered by an appropriate cover material to prevent maggots. If maggots are considered beneficial, for example as supplementary chicken feed, then one may choose to explore ways of promoting the antithesis and encouraging maggot populations, which are also known for their medicinal properties, maggot extract being a key source of certain vaccinations (Pauli 2010). Ultimately, whatever the system employed, process control is essential in preventing problems, which could escalate and become detrimental to human well-being.

Process control ties in with ‘source’ and ‘sink’. The concepts of ‘source’ and ‘sink’ need to be well understood in order to be managed properly. This is especially true as regards grey water. Grey water can be harmful to gardens and it can quickly start to smell if the correct bacterial balance is not maintained. Grey water containing

many chemicals will quickly saturate the sink capacity of a smallholding. An indicator of things going wrong is a foul smell, water logging and/or dying vegetation. By reducing the amount of chemicals at source, one can increase the volumes at the sink. What is required when working with ecological systems is to work with nature through observation, combined with continuous process control. Reducing water consumption also assists by not overwhelming the sink capacity but, as stated above, this is dependent on process control. It may for instance be beneficial to increase the clean water supply, dilute the grey water at sink to maintain the right bacterial balance. When dealing with other composting processes, for instance human and barn manure, time is the most relevant factor of process control. It is important that the volumes being composted have systems that allow for the correct timeframes for proper composting.

As regards solid waste management, the best way to improve such systems is to reduce the amount of packaging consumed. Producing goods locally, which can be consumed fresh, straight from the farm, is an impromptu way of achieving this. ‘Impromptu’ systems work much better than laborious ones. Production of meat, eggs, vegetables, beer and dairy on sight facilitates the use of recycling packaging. Containers that would otherwise qualify as solid waste can be used for potting, bottling, storing dried and preserved food. Feedbags can be used for waste disposal, storing or selling compost or wood. In the end, we still discard some of our waste in a landfill; it is a privilege that we don’t have to accumulate our final waste on site.

If one wants to improve safe domestic waste management, the following determinants need to be adhered to: laws and regulations that facilitate alternative waste management systems; knowledge building that improves process control; consideration of whether the source material is relatively suited to the sink capacity; encouragement of production diversification

through integrated farming systems where the waste from one system is an input in another.

The close examination of selected quintessential determinants unpacked above can be amalgamated into a comprehensive portrayal of the determinants applicable to the case study from a holistic point of view

5.2 The niche settlement context: holistic overview

In chapter 1, I explained how we find ourselves in a predicament, which is not unlike that of a rat lured into a trap with no known escape route. The trap itself is now part of who we are as a species on this planet. The only way out that my partner and I saw was to disconnect from those elements in the system deemed poisonous, in order to see whether this separation would reveal a way out of the trap.

I also explained how having paid off the land we resigned from our regular city-based lifestyle, cashed in a pension fund and moved into the country, proceeding to develop the land with periodical cash injections earned from various part-time activities in the mainstream economy. I also shared how what we assumed would be tough but, at least, straightforward proved more complicated than we had anticipated. In addition to the discomfort and inconvenience of doing everything ourselves (learning, clearing, constructing, planting, tending, rearing, milking, slaughtering, conserving and recycling) we were dismayed to discover that we were still ensnared by processes that threatened our tentative, fragile, off-grid project. These elements, in the form of municipal by-laws and zoning regulations are not only antithetical to our project, but would actually render our agrarian livelihood illegal. The taken-for-granted limiting assumptions (in the case study refer chapter 3.3.1) underpinning the by-laws and regulations are reminiscent to elements of the trap that humanity finds itself in.

Meetings with the head planner of the Overberg area in 2011 and 2012 highlight the key issue, see appendix 4 (Hattingh 2011)The outcome of meetings with Mr Hattingh is that the residential 1 zoning being applied in Suurbraak is not in actual fact strictly correct. As yet the zoning scheme for Suurbraak has not been approved by Provincial Government, this means that Suurbraak falls under Section 14(1) of Ordinance 15 of 1985 that zones land from 1 July 1986 onwards, based on lawful utilisation on that date (Hattingh 2011). This defines how zoning is determined by municipalities. Uncovering this information represented an important exercise in determinate negation.

Much is at stake not only for our off-grid rural niche context but also for the valley as a whole and its rich heritage that everyone is keen to uphold. It is therefore incumbent on all of us to find ways in which key determinants for sustainable rural development are acknowledged and can inform these official documents.

5.3 The rat trap

It is necessary to acknowledge that our niche project was individual and/or personal in nature and represented a utopian agrarian aesthetic bundled up into pragmatic modelling (Constanza 2003). The project and this study does not address the exigencies of town planning with respect to many issues, such as controlling health aspects relating to cottage industry[82] and possible urban sprawl resulting from the subdivision of agricultural land. However, without a dialectic that takes into account the principled, pragmatic modelling processes that individuals such as ourselves embark upon, all that existing by-laws and regulations would deliver would be a counter aesthetic; this includes the proliferation of concrete block-houses, grid services, connecting highways superimposed on depleted landscapes, impoverished human beings and suffering animals. Consequently, the very nature of the problem - the metaphoric rat trap - isn't recognised for what it is -

[82] Producing artisanal product for markets from home.

part of the very nature of who we have become as a species. Consequently, alternatives to the status quo are rarely acknowledged and therefore unlikely to be envisaged and attempted on a large scale.

Dissatisfaction with the march of a socio-economic regime is not a new theme, as illustrated in Thoreau's *Walden* or *Life in the Woods* (1995). Thoreau showed that by cutting costs through self-sufficiency one is less reliant on exchanging labour for wages (Thoreau 1995). He lived out his philosophy by building a log cabin and living off nature for a number of years. Similarly, with our modern interpretation of the self-sufficiency problem, the fact remains that our development entailed financing. We relied on capital to set up our interpretation of sustainable rural living. It is however the nature of the niche household that most income earned is invested to improve the autonomy, sustainability and resilience of the systems which can always be improved, this means that we are financing increased autonomy (increased savings on bills and income from surplus produce). The project is scaled at 15 kg of concentrate input feed per week and produces beer and cheese to the value of R1 000 per week, this does not account for the eggs, meat, vegetables and fruit also produced on site for self-consumption.

Most of our personally-grown food is therefore no longer of doubtful origin. We trust that the food we produce is safe as we use no pesticides or chemical inputs, we cannot however trust that our feed inputs are, or that the air that periodically drifts across from conventional farms laced with lung-burning chemicals is safe. We did not gain independence but rather interdependence. Our agriculture requires constant supervision, everything is watchful, not only livestock and pets but all of nature wants to partake in the bounty, every bird, cricket, mouse, baboon knows our designs, which must therefore continually adapt to the changes taking place in the culture-nature relationship.

This all-consuming approach opens up new vistas of perspective, where ideas once held fundamental, are reconceptualised. This change in perspective can be understood by asking basic questions such as: why is this bought egg yolk pale yellow rather than bright orange? Why is this cheese bright orange and not white as milk? And one will end up exclaiming: “Ah this is now real beer!” This anecdotal evidence retraces a fundamental journey back to quality, health and taste.

The context (note: not the practitioner) therefore, with time, unpicks the original ideas of the brainwashed practitioner by, amongst other things, illustrating new possibilities, new meanings and nuances of being. The original theoretical ideas are thus irrelevant, in that the practitioner has fundamentally changed and new reference points are determined.

The quest of the practitioner is in unearthing these answers by entering into an unending dialectic with nature. The cumulative effect of this reinforces the various systems of metabolic unification and the systems, operating synchronously at a holistic level, embody the functional antithesis, symbolised as niche settlement. This epitomises a functional counterpoise to the status quo.

The practitioner’s mind - inherently limited by ‘bio-load’ - is occupied on narrow issues that when resolved ripple out into a larger process of mind, embedded in the systems themselves (Bateson 2000). With time and experience (systems experience/learning and not just the practitioner’s), intuitive viability is improved, resulting in deeper resilience

This process represents a concerted attempt at escape from the horrors of the poisoning and exploitation of our environment via stewardship of small piece of land. Does this expression of metabolic unification amount to an escape from the rat trap introduced in chapter 1? Intuitively I feel there is a common thread, culturally and philosophically, between the dilemma of the rat in the trap and that of the sacrificed and tumour-ridden rats forming part of the seminal two-year long Seralini toxicity trial

discussed in chapter one (Séralini et al. 2012), Whether one, wittingly or unwittingly, is an active participant of an experiment, one must ultimately succumb to the results.

Concluding remarks

This study had two primary research objectives. Firstly, to analyse a single, small-scale, off-grid livelihood operation in Suurbraak in the Swellendam magisterial district of the Western Cape, South Africa, using a Hegelian lens that assumes a process of "determinant negation" (Dove 1970:623), in order to arrive at a list of key determinants for success applicable to this operation, and one that may be relevant to other contexts.

Secondly, the study hypothesises an ideal niche model for sustainable rural human settlement that represents an antithesis to the current rural settlement regime.

The above objectives were achieved by asking the following research question: **Is off-grid self-sufficiency a sustainable alternative for rural livelihood? If so, what are the determinants of success for such an alternative?**

Research outcome

The outcome of the study can be elicited at different levels: at the micro-level (case study), meso-level (agri-settlement of Suurbraak) and at the macro-level (municipal policy).

At a micro-level, the result of this study, stated in Hegelian language, was that the antithesis became embodied in a "concept" of niche settlement and that it culminated in an operational "standard" in the form of the case study (Dove 1970:621).

In other words, it can be asserted that the model proposed in the case study has demonstrated its success, the case study having proved itself to be functional,

embodying its stated principles, and embodying the stated Spirit of a 'niche' settlement.

The study however underlines certain provisos to the 'niche' settlement approach. Most importantly, the economic viability of the 'niche model' proved limited, because as an autonomous system it still relied on economic linkages with the economic regime (it is important to underline that the project was under a developmental process and only four years old). Furthermore, interventions tested in chapter four focusing on the micro-level were often unsuccessful. To highlight a few: some of the proposed building methods were ineffective, the food gardens at times had limited productivity, the original solar systems proved inadequate, and the manure composting systems had shortcomings. However, within the context of the chosen methodology of "determinate negation", all these negations were illustrated as temporary drawbacks to the 'niche' settlement, because each negation invoked a response. This epitomises an on-going process of bringing the "concept" of 'niche settlement' in line with its "standard", the determinate (case study), via a process of knowledge building towards the principles embodied by the antithesis.

At the meso- and macro-levels, a relevant outcome from the research was that, as demonstrated in 5.2 of this chapter, the zoning being applied to the village is that of residential 1, which prohibits any farming activities. The village is therefore following the same development route as the majority of other Western Cape villages, despite the stated importance of protecting the heritage, preserving its character and encouraging small-scale farming (Swellendam Municipality 2008, 2009).

This research outcome has the following implication in that the engagements that I have initiated with municipality officials may influence the Swellendam municipality regulations (2008, 2009, 2011), which are undergoing a review process. One of the key anticipated changes pertains to the zoning discussion; in my latest interaction with the municipal planner Mr. Hattingh (2012), I was informed that the municipality

was in the process of revising the zoning of certain areas of Suurbraak to extensive residential zoning, this zoning would facilitate the 'niche' settlement approach.

Contribution to the body of research

There are a number of important findings stemming from the case study, which contribute to academic research on the topic of sustainable land-based livelihoods.

Firstly, the study proposes a methodology for defining determinants, which forms a typological basis for knowledge building in the aforementioned areas. However, the study cannot lay claim to offering a generic list of key determinants that might inform rural settlement as a whole. The proposed determinants would however be a good starting point for further research towards such a generic list.

Secondly, in using a "determinate negation" methodological approach applied to a real context, the study brings forth the fact that systems, tools and ideas proposed as an antithesis to the conventional and established norms shouldn't immediately be dismissed on the grounds that they are alternative. Deeper determinate processes can usually bring to light creative solutions.

Thirdly, the analysis reveals a unique set of determinants applicable to each intervention in the case study. One can contend that the dialectical process that gave rise to these determinants could make them applicable to similar context situations. These interventions therefore constitute an important resource for anyone interested in furthering metabolic unification via the decentralised niche settlement approach.

Fourthly, all the interventions that were described as operational at the micro-level represent an example of manifest truth. Taken together, these interventions portray an alternative or antithesis to the current rural settlement regime.

Fifthly, the negation of the antithesis (case study/self sufficiency/agrarian heritage) by the non-facilitation of its stated determinants (for instance via restrictive zoning) is a

systemic blockage to adaptive progress in terms of livelihood strategies in general (regime/thesis).

Sixth, the negation of regulations (a new concept) is necessarily reliant on the embodiment of appropriate antitheses at the microcosm (a new standard) able to illustrate the virtues of niche settlement; the case study is arguably representative of this.

Seventh, knowledge building in line with new determinate insights (standard) has power in that it increasingly affirms the antithesis with respect to the contrary moment, the thesis (regime).

Eighth, if there is a route of escape from the aforementioned rat trap, it might lie in the void created between thesis and antithesis, here there must at least be a prospect of adaptive change in rural settlement towards a new synthesis?

These points reinforce the value of Constanza's (2003) pragmatic modelling approach adopted in the research, of envisioning, implementing and testing. That is, if niche settlement appropriacy is considered a viable alternative in the looming context of a financial crisis, ecological crisis, food crisis (Swilling & Annecke 2012), and resource scarcity (Almeida & Silva 2011, Jason 2011). If so, then setting out on a path of knowledge building with a view to overcoming the obstacles as well as facilitating the determinants to niche settlement are critical processes that must begin with envisioning a comprehensive alternative to the existing paradigm.

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ADDENDA

Appendix 1: Beneficial plants and plot diagram

Table 9: List of beneficial plants[83]

Key	PLANT	EXOTIC	INDIGENOUS	LOCAL	PRIMARY USE	LITERATURE
1	*Acacia* Karroo		X	X	Medicinal/food value/rope/fodder/pioneer	Venter F, Venter J. 2002:22
2	*Acacia* Monkey Thorn		X		Fodder/rope	Venter F, Venter J. 2002:20
3	*Acacia* Paper bark		X		Medicinal/fodder	Venter F, Venter J. 2002:30
4	Aloe		X	X	Medicinal	Van Wyk, Gericke. 2003:120
5	Apple	X			Fruit	
6	Banana tree	X			Fruit	
7	Black stinkwood		X	X	Medicinal/valuable wood	Thomas et al. 2008:312
8	Blue berry	X			Berries	
9	Blue bush		X		Medicinal/coffee substitute	Van Wyk, Gericke. 2003:206
10	Bracken		X	X	Shade/mulch/food	
11	Bushman's tea		X		Medicinal	Thomas et al. 2008:160
12	Bush tick Berry		X	X	Fruit/soap	Thomas et al. 2008:160
13	Cabbage tree		X	X	Medicinal	Thomas et al. 2008:278
14	Camphor Bush		X		Retaining banks/medicinal/hedges/fodder	Venter F, Venter J. 2002:282
15	Cape beech		X	X	Medicinal/Valuable wood	Venter F, Venter J. 2002:252
16	Cape goose berry		X		Berries	Van Wyk, Gericke. 2003:54
17	Cape holly		X		Medicinal/fruit	Venter F, Venter J. 2002:198
1	Centella	X		X	Medicinal Food	Van Wyk,

[83] The common names are used to reference the utility plants grown, if the genus name is part of the common name, it is italicised.

8						Gericke. 2003, 142
19	Coast coral tree		X	X	Medicinal/living hedge	Thomas et al. 2008:194
20	Common currant *Rhus*		X	X	Deciduous Pioneer/axe handles/fodder/hedges	Thomas et al. 2008:212
21	Common thorn apple		x	X	Medicinal	Thomas et al. 2008:162
22	Criss-cross turkey-berry		x	X	Fruit/wood	Thomas et al. 2008:303
23	*Ficus* Natalensis		x		Fire sticks	Van Wyk, Gericke. 2003:290
24	Field Mushroom		x	X	Mushroom	van der Westhuizen G, Eicker A.1994:102
25	Fig	X			Fruit	
26	Geranium		x	X	Medicinal	Heinamann et al. 2008:50
G	Granadilla creeper	X			Fruit	Van Wky, Gericke. 2003:52
28	Grape	X			Fruit	
29	Green manure				Manure	
G	Imphepho		x	X	Medicinal	Van Wky, Gericke. 2003:206
F	Indigenous forest species				Shade/mulch	
30	Ironwood		x		Valuable timber	Thomas et al. 2008:320
31	Karoo boer-bean		x		Food	van Wky, Gericke. 2003:24
32	Kei apple		x	X	Fruit/fodder	Venter F, Venter J. 2002:134
33	Keurboom		x		Nitrogen fixing/pioneer	Thomas et al. 2008:198
34	Lime	X			Fruit	
35	Macadamia	X			Nuts	
36	Natal guarri	X			Medicinal	Van Wyk, Gericke. 2003
G	Num num		x	X	Fruit	Venter F, Venter J. 2002:
37	Olive tree		x	X	Medicinal	Venter F, Venter J. 2002:220
G	Parasol mushroom		x	X	Mushroom	van der Westhuizen

						G, Eicker A.1994:62
38	Pear	X			Fruit	
39	Pigeon pea	X			Food/nitrogen fixing	
G	Pioneer spiketthorn		x	X	Making implements/thorny pioneer hedge	Thomas et al. 2008:218
40	Plum	X			Fruit	
41	Pomegranate	X			Fruit	
42	Prune	X			Fruit	
43	Safsap willow		x		Medicinal/retaining banks	Venter F, Venter J. 2002:270
44	Sagewood		x		Medicinal/useful wood	Thomas et al. 2008:176
45	Sausage tree		x		Medicinal	Venter F, Venter J. 2002:198
46	Sorgham		x		Beer brewing	
G	Sour fig		x		Fruit	Van Wky, Gericke. 2003:36
47	Strawberry	X			Fruit	
48	Tree fuchsia		x	X	Medicinal/fodder	Venter F, Venter J. 2002:198
49	Vetch	X			Nitrogen	
G	Water berry		x		Medicine/fruit/fuel	Venter F, Venter J. 2002:280
G	Waxi currant *Rhus*		x	X	Pioneer firebreak hedge/fuel	Thomas et al. 2008:212
50	White Karee *Rhus*		x		Medicinal/borer termite proof poles	Venter F, Venter J. 2002:266
G	White stinkwood		x		Medicinal	Thomas et al. 2008:374
G	Wild bramble	X		X	Fruit	van Wyk, Gericke. 2003:54
51	Wild olive		X	X	Medicinal	Heinamann N, et al. Undated:66
52	Wild peach		X		Fodder	Venter F, Venter J. 2002:200
G	Wormwood		X	X	Medicinal	Van Wyk, Gericke. 2003:142

Key: G – Generally dispersed, F – Indigenous forest areas.

The numbers in the table above are referenced on the plot diagram below, indicating that on a small piece of ground, over time everything has its place and value to those the custodians of the land.

Table 10: Utility trees on 1 000-square metre plot

Appendix 2: Letters addressed to municipal officials: Contradictions in official documents

Att: Planning Department

Swellendam Municipality

4 July 4, 2012

Dear Mr Hattingh

Letter relating to some earmarked contradictions I unearthed in official documents.

Let me start by saying how pleased I am for your willingness to dialogue on these issues, herewith is more detail of the few problems we discussed in June relating to Swellendam Spatial Development Framework (SDF), Integrated Development plans (IDPs) and the Integrated Zoning Scheme (IZS). I especially value a correspondence with you on the following as these issues relate to my Masters with the Sustainability Institute at Stellenbosch University, which should be available from December 2012.

The introductory comments of SDF and IDP are as follows:

> Suurbraak is a picturesque rural town with origins as a historical mission station established by the London Missionary Society in 1812. The development of the town's tourism potential, based on its landscape setting and built heritage assets as well as its potential to accommodate small farmer development should take precedence in terms of promoting local economic growth. (Swellendam Municipality2008)

However, acknowledgement of this village agrarian heritage is worthless unless this is actually reflected in the zoning laws that inform the scope of what is actually considered legally permissible in zoning regulations. I have noted that there is little carry through into the actual Integrated Zoning Scheme (IZS) of many of the stated intentions laid out in SDF's and IDP's. My key areas of focus are:

- Heritage precedent in terms of people's rights to use their land for agricultural livelihood diversification.

- Heritage precedent in terms of people's access to natural resources.

This is supported by the leading objectives for the region:

> *The objective for Suurbraak and Buffelsjagsrivier 'Agriculture/Tourism/ Rural Settlement/Agricultural industries (Buffeljagsrivier) Historic precinct, Agricultural activities (Swellendam Municipality 2008:53).*

The community should have equitable access to resources and opportunities (Swellendam Municipality 2008:5).

Nowhere in the zoning scheme definitions is access to resources defined.

Land use ***Zoning Conservation 1***

Natural resources could be used, harvested or extracted, if and only if such use/harvest or extraction is compatible with the area and would be sustainable (Swellendam Municipality 2008: 31).

Nowhere in the integrated zoning scheme is this right acknowledged.

Land use ***Zoning Conservation 2***

Harvest of natural resources on a sustainable basis, provided that such use is compatible with this area. Extensive grazing at an appropriate stocking rate (Swellendam Municipality 2008:32).

Nowhere in the integrated zoning scheme is this right acknowledged.

Land use *Zoning* ***Conservation buffer***

Support the diversification of the agricultural sector in terms of agri-tourism and value adding in the Sub-region. Promote research into sustainable use and harvest of indigenous natural resources (Swellendam Municipality 2008:36). Nowhere in the integrated zoning scheme is this right acknowledged.

Objective 1: Implement guidelines to protect the rural character of the area and scarce/valuable agricultural soil.

Objective 2: To designate transition areas that can accommodate land use diversification.

6.4.4 Rural residential

(i) Motivation:

Rural residential is a recent land use phenomenon of most towns and is a direct response to the demand for residential living in a rural environment. Rural residential does not involve sustainable agricultural land use practices although agricultural related activities may occur in these areas (Swellendam Municipality 2008:76).

Nowhere in Suurbraak is any land zoned rural residential.

The existing gross density of Suurbraak is approximately 6 units/ha. This relatively low density is a result of the historical settlement pattern of larger erven, especially along the river, where the allotments are utilised for subsistence farming. This forms an important part of the historical character of Suurbraak and the retention of this rural character should be protected in a Heritage Overlay zone. (Swellendam Municipality 2008:134)

If this land is being utilised for subsistence farming then the zoning rules should facilitate these agrarian rights as per village heritage. The zoning here of residential 1 removes these precedent rights.

Planning Area and Land Use Character Existing Typical Erf Sizes and Residential Densities Land Use Guidelines PA1: Rural residential 1 000 – 3 000m² ± 4 units/ha (Swellendam Municipality 2008:137).

The IDP contradicts this (Swellendam Municipality 2011:137)

The community should have equitable access to resources and opportunities; planning policy should ensure sustainable use and development of the natural, built and cultural resources of the Swellendam Municipal Area (IDP 2011:65).

Again the resource issue but no zoning category that acknowledges any such rights.

The integrated Zoning scheme regulations make their applicability abundantly clear (a) No land unit falling into a zone shall be used for a purpose other than those uses permitted in terms of this Scheme; provided that where a land unit may be used for a purpose with Council's consent, such land unit may be used for such purpose after Council's consent has been obtained; provided furthermore that any other land use, which is legally approved in terms of the Planning Act or legally exists in terms of this Zoning scheme, may continue to be conducted from such land unit. (IZSR 2009:36)

In terms of Suurbraak the residential 1 zoning removes people's agrarian rights while the other zoning categories listed do not specify access to natural resources. In terms of commonage land use, the surrounding veld and forest land? This land also falls under the municipal zoning regulations. This land use precedence is commonage heritage value to the community, entrenched over two centuries. The land is utilised for: fuel wood harvesting, communal foraging, harvesting building materials such as, wood beams, wattle latte as well as collecting medicinal herbs and mushrooms? All this is in line with Forestry policy directives. According to the South African Ministry of Water Affairs and Forestry's White paper of 1997:

> The overall goal of Government is to promote a thriving forest sector, utilized to the lasting and sustained benefit of the total community, and developed and managed to protect and to improve the environment (Ministry of Water Affairs and Forestry: 1997,4).
>
> Contrary to the traditional view of forestry as the science of managing forested land, forestry today is about the relationships between people and the resources provided by the forest. It includes the use and husbandry of the wood, fruits and

> other products that come from trees, as well as the wildlife that dwell in the forest. (Ministry of Water Affairs and Forestry 1997:4).

In the Zoning regulations there is no primary use allocation that would support the above definition and activities considered. (Swellendam Municipality 2009:141)

However ,forestry is listed as a consent use for this zoning category. But the forestry definition makes no mention of the community forestry rights.

Forestry (bosbou) means the extensive planting of trees in veld and mountain areas for commercial purposes.

The small farmer who usually is not well educated (Datadesk 1996), is shackled by this incongruous legislation. The extreme complexity of rules and regulations all seeming to contradict each other. I consider these above listed claims in the SDF and IDP mere window dressing, unless the statements are born out in the Zoning rules applied by the municipality in the public domain.

Furthermore, I would add: integral to the maintenance, support and development of village heritage is a deeper understanding of the almost two-century-old determinants that brought about this heritage. I do not see anywhere in the SDF and IDP any inclination to pursue future development along the lines of the founding values that determined the village in the first place, most of the development emphasis is towards low cost housing densification. This SDF stated intent contradicts the documents stated heritage preoccupation in the more flowery extracts, to me this point also renders these claims mere window dressing. The documents justification for densification is that there is no room for village expansion, this is simply incorrect if one considers that there is almost 3 000 hectares that legally should be allocated to the inhabitants on an equitable basis (Datadesk 1996).

In view of my Masters, I would appreciate any constructive correspondence to iron out any false assertions I may have made in my interpretation of the above regulations. I look forward to any further dialogue on these issues and would like to

flag my interest in reviewing and commenting on any amendments to these above-mentioned documents.

Regards

Matthew Mentz

Appendix 3: Letters addressed to Municipal officials: Community forestry

a) Letter addressed to the Municipal Manager, Swellendam Municipality, on 22 May 2012, re communal forest access

From: Matthew Hendrik Mentz

Att: Municipal Manager

Swellendam Municipality

Community Forestry, Authorization request for forest access key.

A gate with a lock now bars community members from harvesting exotic timber from the municipal forestry area that is overgrown and clogged up with invasive tree species, this wood is a source of livelihood for many community members. I am building an eco house and sometimes utilise these trees as construction materials: particularly blue gum and wattle timber I also use the forest to collect firewood and mushrooms, can **you therefore please give me authorisation so that I can get the gate key from Desmond at the Suurbraak office**?

I would also be interested in knowing what the official municipal standpoint is regarding providing the community with access to community forestry products, in view Swellendam Municipality claim of maintaining Suurbraak's distinctive agri-village heritage and in view of national policy, see quotes below:

> The overall goal of Government is to promote a thriving forest sector, utilized to the lasting and sustained benefit of the total community, and developed and managed to protect and to improve the environment (Ministry of water affairs and forestry: 1997,4)." "Contrary to the traditional view of forestry as the science of managing forested land, forestry today is about the relationships between people and the resources provided by the forest. It includes the use and husbandry of the wood, fruits and other products that come from trees, as well as the wildlife that dwell in the forest. (Ministry of water affairs and forestry 1997:4)" "Forestry Law… The mandate for the government's role in the forest sector is derived from the National Forests Act 1998 (Act 84 of 1998) (NFA) and the National Veld and Forest Fire Act, 1998 (Act 101 of 1998) (NV&FFA). This has set out new legislation based on the premise of sustainable forest management.

Under this Act, the Chief Directorate: Forestry is obliged to:

- Address sustainable utilisation and management of state forests;
- Promote economic and social development and utilise the developmental potential of forestry;
- Give the South African people a greater access to the country's state forests;
- Improve equability in the distribution of benefits flowing from state forest resources; and
- Conserve forest biodiversity. (Department of Water Affairs and Forestry 1997)

Yours sincerely

Matthew Hendrik Mentz

a) Letter addressed to the Municipal Manager, Swellendam Municipality on 25 July 2012, re community forestry access authorisation

Dear Mr Nel

Thank you for your reply dated 16th July 2012 where you declined my request for access to the forest to harvest exotic timber for domestic use. Unfortunately, your committee has not furnished me with a thorough answer to my two-part question regarding community access to the Suurbraak municipal forest. I am therefore re-submitting the extract from the previous correspondence from the letter I wrote on 22nd May (ref. italics below[84]).

[84] I would also be interested in knowing what the official municipal standpoint is regarding providing the community with access to community forestry products, in view of the Swellendam Municipality's claim of maintaining Suurbraak's distinctive agri-village heritage and in view of national policy, see quotes below:

The municipality's negative response to my query seems to suggest that community forestry is not endorsed by the municipality? If this is the case, this is confusing; it raises a few more points, which require clarification:

1. The sudden appearance of a gate barring forest access alters the precedent use of community access to the forest, was there community consultation in this sudden departure from a two-century-old precedent[85]?

2. The Spatial Development Framework lists community access to natural resources, which would pertain to the above issue, in a number of sections (Swellendam Municipality 2008:31, Swellendam Municipality 2008:32, Swellendam Municipality 2008:36). How does the municipality facilitate these references, do these SDF claims have any bearing to the reality on the ground, if not what would be the reference document which addresses these issues?

3. Certain community members have been given access to the forest to use timber for both commercial and private use, this seems to indicate some form of preferential treatment, I trust that this is not the case?

4. If there is any criteria regarding preferential access or any regulations pertaining to restricting community access to both timber and non-timber

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The overall goal of Government is to promote a thriving forest sector, utilized to the lasting and sustained benefit of the total community, and developed and managed to protect and to improve the environment (Ministry of water affairs and forestry: 1997,4)." "Contrary to the traditional view of forestry as the science of managing forested land, forestry today is about the relationships between people and the resources provided by the forest. It includes the use and husbandry of the wood, fruits and other products that come from trees, as well as the wildlife that dwell in the forest. (Ministry of water affairs and forestry 1997:4)" "Forestry Law… The mandate for the government's role in the forest sector is derived from the National Forests Act 1998 (Act 84 of 1998) (NFA) and the National Veld and Forest Fire Act, 1998 (Act 101 of 1998) (NV&FFA). This has set out new legislation based on the premise of sustainable forest management.

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- Improve equability in the distribution of benefits flowing from state forest resources; and
- Conserve forest biodiversity. (Department of Water Affairs and Forestry:1997)

[85] I have been informed that the gates original intent was to prevent the pillage of timber by a commercial sawmill that was extracting large volumes of timber from the forest.

forest products, please can you indicate to me the regulations and applicable references, which would inform decisions making in this regard?

I trust you will appreciate my need for clarification of the above points raised.

Yours sincerely

Matthew Mentz

Suurbraak resident

b) Response received by the Municipal Manager to the above mentioned correspondence

Munisipaliteit Swellendam Municipality

Munisipale Kantoor

Posbus 20
SWELLENDAM, 6740

TeL (028) 5148500

Faks No. (028) 5142694

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E-pos / E-mail : 1nfo@swellenmun co.za

Date 15 August 2012

E-mail 4thatmatter@gmail.com

Mr. Matthew Mentz
SUURBRAAK

Sir

COMMUNITY FORESTRY

Your letters dated 22 May 2012 and 25 July 2012 in afore-stated regard refer.

Your request has been considered by the Swellendam Municipal Council and has been declined.

With regard to your various comments and interpretations the following should be noted:

- The "Suurbraak Forest)/ is partially owned as an Act 9 Area by certain part of the Suurbraak Community, managed by a Board of Trustees (Suurbraak Community Forum) and the Suurbraak Aksie Komitee. The remainder of the Suurbraak Forrest is municipal commonage.
- The portion of the "Suurbraak Forest" owned as an Act 9 Area, cannot be considered as general public land and ownership is restricted to certain families of Suurbraak, who have historically ownership of the land from the previous "Apartheid" dispensation. These areas are referred to as Act 9 Areas and is considered as "tribal land" owned by a portion of a community. The afore-stated land ownership is vested in the National Minister of Land Affairs, and is administrated collectively by the local municipality and the involved community through their Board of Trustees. Although Suurbraak cannot be considered as a so called "tribal area", it is notwithstanding listed as previous mission station as land regulated by Act 9. In the Western Cape various similar examples exist, such as Elim, Genadendal, Slangrivier, etc.
- The community access program you are referring to is a program administered by the National Government and is applicable for central government owned forest. This program is not applicable for Suurbraak.
- Reference in the Municipal Spatial Development Framework to natural resources refers to the access of the broad communities to land and water, which in the pass was restricted to certain groups of the general population in the "Apartheids" dispensation. This principle does not mean that you will be allowed free access to the Act 9 Forest Area, although it confirms your right as local resident to access to the municipal commonage. The use of the municipal commonage must however be by application, which can be declined by the municipal council who is the curator of the municipal commonage.

- The involved gate to restrict access to the "Suurbraak Forest" has been installed on request of the Board of Trustees of Suurbraak / Suurbraak Aksie Komitee. The reason for the locked gate was to restrict the harvesting of wood. It is quite correct that the involved Board of Trustees do allow certain people to harvest wood. As "owners" and beneficiaries of the involved land it is their constitutional right.
- The conditions to preferential access to the Act 9 Forest Area is determined by the Suurbraak Community Forum Board. My understanding is that it is restricted to the beneficiaries of the land in terms of Act 9.

I trust that all your questions have been addressed. Please note that as a non-Suurbraak beneficiary you can unfortunately not lay claim to the use of the Act 9 land.

Yours faithfully

N. NEL

ACTING MUNCIPAL MANAGER

Appendix 4: Interview summaries with municipal officials and farmers

a) Interview with M. James Engel Deputy Director of Community Services, held on 9 September 2011

Can you tell me about the Suurbraak commonage?

Total commonage 2 755 hectares of which 1 559 is veld and 1 196 is good land. Andy Arense knows a lot about the history, but the land was initially donated by the church. It is predominantly used for grazing although some land parcels are used to grow grains and corn. The land is leased for three-year periods at a cost of R5/hectare. The land on the northern side of the Buffeljags is mostly private property, most locals have sold to rich outsiders, rates are much higher here about R10 000/per hectare per year. This side has agricultural water supplied by a dam in the mountain.

Why is there no community market in the village?

The local economic Development Officer Lauraine Venter 0285148510 would better answer this query.

Do you think a community slaughterhouse would be a useful addition?

Yes, the small farmers have to hire trailers to get their livestock to auction, you can't sell meat without a certified stamp, but the community need to identify this as a need, get it into the IDP and then lobby for funding from the relevant department.

Do you think a community dairy would be a good idea?

Yes, a cheesemaker from Ashton had already expressed interest in goat farming dairy in the area as they are productive and low maintenance.

The municipality built a piggery for the community because health officials have stopped people farming pigs in their backyards. Land was rezoned for a piggery and chicken farming. However, this is not going well as the people do not work well communally. However, in Napier it has worked people pooling common resources.

Do you think it is good idea stopping people farming in their backyards?

People do not have enough land to farm in their yards; the RDP house is 40 square metres and the plots are 190-250 square metres.

a) Interview with M. Willie Hattingh Town Planning and Building Control Official, held on 9 September 2011

What are the people of Suurbraak's agricultural rights?

We are busy compiling integrated zoning regulations. But the town is mostly zoned residential 1 with a few examples where people have applied for consent use such as the Emu farmer. The northern side will be zoned extensive residential by the middle of 2012, as there are no services foreseen on this side of the river.

How does someone go about applying for consent use to farm?

Application form and payment of R3 000. The municipality then advertises, it is then referred to relevant departments including a possible Environmental Impact Assessment (EIA) (basic assessment is cheaper). The process takes two to three months if there are no objections. If approval takes place, interested parties have 21 days to appeal to province.

What is the term of consent use?

Consent use is permanent; departure from zoning is temporary (five years).

b) Interview with M. Willie Hattingh, Town Planning and Building Control Official, held on 28 May 2012

Summary of key points of discussion

Willie admits to me that they are re-thinking the zoning of Suurbraak as residential 1. He further explains that, in fact, officially Suurbraak has no zoning at present, the residential 1 zoning was only a provisional zoning. The zoning that would strictly apply to Suurbraak is in terms of section 14(1) of the Cape Land Use Ordinance no 15 of 1985 (Western Cape Provincial Administration 1985). By coming into effect on 1 July 1986, it means that the land use at the time of the ordinance is the default land use zoning for the area.

The Rural Areas Act no 9 of 1987 also determines what is possible on Suurbraak land, as Act 9 of 1987 applies to missionary villages. He recommended that I speak to Ian Blanchor 0214834797 and Marius Swart 0285141182/0824962277.

So, in fact, there is no zone map yet compiled for Suurbraak.

The zoning that would strictly apply to Suurbraak is ordinance 15 of 1985 (Western Cape Provincial Administration 1985). By coming into effect on 1 July 1985, it means that the land use at the time of the ordinance is the default land use zoning for the area.

Act 9 also determines what is possible on Suurbraak land, as Act 9 (date unspecified) applies to missionary villages. He recommended that I speak to Ian Blanchor 0214834797 and Marius Swart 0285141182/0824962277.

So, in fact, there is no zone map yet compiled for Suurbraak.

He said that our discussion in 2011 helped convince him that residential 1 was in fact the incorrect zoning category, he is now thinking of suggesting agriculture 1 with certain overlay rules, such as the number of livestock, boundary borders, etc.

To my queries regarding the SDF contradictions, he said that it had only been accepted by council not by province, that a consultancy was presently being appointed to go through the document and identify errors and gaps, he said at this stage no one had picked up the

contradictions that I have earmarked and that I should send him a brief report pinpointing the discrepancies.

There are significant contradictions between maintaining heritage and the zoning rules of residential 1.

On the housing issue, he says that the councillors are the ones driving the low-cost housing process. Suurbraak is not a growth node and therefore not prioritised for development, but the councillors voted in by the Suurbraak constituency are under pressure to deliver on the housing requirements.

The SDF consultants are Urban Dynamics.

c) Interview with Christi Lawrance, Land Care Swellendam, held on 28 May 2012.

Summary of key points of discussion

Suurbraak is Moravian church land, as are Elim and Genadendal. The small-scale farming in these communities is important.

On the subject of conventional ecological farming practices, he recommends I should rather speak to Piet Uys, to find out what large-scale grain farmers are doing. He couldn't comment on commonage lands and forestry and suggested speaking to municipality officials or Land Care head office.

d) Interview with Piet Uys, farmer and member of the Foundation for Farming, held on 28 May 2012.

Piet Uys is a biological farmer[86], who grows grains and runs a dairy farm. One of the Foundation for Farming's aims is to help small farmers in Africa. He agrees that conventional farming is not sustainable. Farmers must make the transition to organic. Farmers must also help with transformation. Due to peak oil, the shift to organic will become necessary to survive as conventional inputs will be out of reach.

He still uses fertilisers, pesticides and herbicides, but rotates crops over ten years, crops include barley, oats, wheat, and canola with lucern. His grains are stored by the co-op but the buyer is a broker called Unigrain. The co-op cleans some of his grain, which he then gets back and uses as seed. His seed suppliers are Sensako and Pannar. To make his silage, material is wetted down 60% and then the 'Silor' product is added to the mix.

He believes things are changing rapidly and the future of African farming will be achieved with a hoe. He uses Roundup to clear vegetable patches.

e) Interview with Ernest Guder, Agricultural Advisor in Oudtshoorn (facilitating local land reform), held on 20 August 2011.

Summary of local land reform farms discussed extracted from the South African Department of Rural Development and Land reform report: *Distressed farms – in provinces* (Unpublished 2010).

Table 11: Summary of local land reform farms

Farm no	Actual farm status at time of interview	Officially listed land reform farm

[86] According to Mr Uys this means they still use herbicides and pesticides as farming tools, but that this method employs a long-term crop rotationthat which is beneficial for the soil.

159	37 people 1 farming	Yes
149	Bought by department with no water rights	Yes
34	Democratic vote by majority beneficiaries ended up in sale of farm	Yes
28	Democratic vote by majority beneficiaries ended up in sale of farm	Yes
159	Majority not farming	Yes
77	Evaluated but not actually bought by department	Yes
388	Equity share project	Yes
427	Rudimentary goat, pig and donkey farmers	Yes
78	PLAAS project 15 farming successfully	Yes
46	No farming taking place	Yes
144	Equity share project dairy doing well	Yes

Further comments extracted from my interaction with Ernest Guder:

- A one man - one farm system would work better.
- Finding farms for the unemployed doesn't work, taking existing farmers and giving them land works.
- The same pesticide residues causing cancer in tobacco are used on fruit and vegetables.
- Low quantity antibiotics in feeds are adversely affecting humans.
- EM works to make compost and pesticides resulting in higher quality crop than conventional inputs. A farmer using EM sold his cabbage at double market value.
- Poor people pay more for quality product because they have less money; they appreciate food value.

Appendix 5: Research road trip, semi-structured interviews

Figure 2: Base questionnaire as basis for semi-structured interviews

Questions	Answers
Farm	
Date	
District	
Farm name	
Farms map reference	
How many farmers share land	
Status Name and contact of farmer available for interview	
Farmer interview	
Agrarian history	
What are your environmental endowments: soil/falling water/land size/aspect/flora and fauna/proximity to	

threats.	
Are your technology endowments appropriate to the scale of your natural endowments: Ploughs, pumps, boreholes, tractors, transport, planters, and harvesters.	
What do you farm	
What is your input cost	
Fuel	
Domestic consumables	
Feed	
Fertiliser Vet	
Pesticides	
Seed	
Wages	
Electricity	

What is your production income?	
How many beneficiaries share the land and what is the average subsistence income required per beneficiary.	
Do you compost?	
Other	
Interviewer observations: environment, technology, social dynamic, productivity.	
Beneficiary interview	
Do you farm for money or for self-livelihood?	
Does the farm owner live on the farm?	
Government support	
Farm size	
Describe farming system in detail	
Percentage land allocated, subsistence or cash crop, motivation of choice: Grazing, Fruit, Vegetables, Fuel	

wood, Other?	
How do you recycle your waste, compost?	
Top seven constraints motivations ideal solution: Land size, Transport, Pests, Inputs, water, Cash flow, Infrastructure, Market access, Market value.	
Cost saving ideas	
Commercial ideas/challenges	
How would an integrated farming approach improve your farming conditions?	
What prevents you from doing this?	
Other points	

Figure 3: Respondents interviews

Interview 01

Date: **Monday 20th August 2011**
District: **Oudtshoorn**
Farm name: **Kop**
GPS Coordinates:
Farms Map reference: **159**
Farms dept land reforms ref no:
Approx distance to closest town: **15km**
Average district farm size:
Value of grant: **R850 000**
How many beneficiaries share land: **47 Coloured**
Beneficiaries available for interview: **One of two active farmers**
Beneficiary interview
Name and status of interviewee **Johannes Coetzee**
Gender **Male**

Age **63**
Agrarian heritage descent **Born on a farm**
Contact **non**
Does farm owner live on the farm **no**
Government support **equipment**
Total farming income **not available**
Farm size **47 hectares**
Describe farming system **Rotate fields between grazing and growing Lucerne, micro chickens, pigs, geese farming. (37 cows, 9 geese, 18 chickens, 13 pigs at time of interview. Harvesting firewood from river banks.**
Percentage land allocated, subsistence or cash crop, motivation of choice: Grazing, Fruit, Vegetables, Fuel wood, Other. **40% grazing 40% Lucerne 10% swamp and fuelwood**
Inputs estimate land values
Fuel: **R1 400/month**
Feed: **not available**

Fertiliser: **not available**
Vet: **not available**
Pesticides: **none**
Total running cost: **not available**
Total Rand income **R2 000/month**
Possible cost saving ideas: **Using manure to make compost and diversifying into vegetable crops**
Possible commercial ideas/challenges
Top seven constraints motivations ideal solution: **Land size, Transport, Pests, Inputs, water, Cash flow, Infrastructure, Market access, Market value: Diesel/Cash flow**
How would an integrated farming approach improve your farming conditions
What prevents you from doing this
Other points: **Market value and access not a problem cooperative buys most produce. Cows fetch around R7 000, pigs R1 300, milk R3.5/l**
Interview 02

Date: **21 July**
District: **Oudtshoorn**
Farm name: **Matjiesrivier**
Farms Map (3322 Oudtshoorn) reference: **34***
How many beneficiaries share land: **1**
Status Name and contact of beneficiary available for interview: **Francois De Kock, owner, Tel 0442725660**
Beneficiary interview
Agrarian history: **Relations have farmed for over 200 years**
What are your environmental endowments: **soil/falling water/land size/aspect/flora and fauna/proximity to threats. 240 hectares, 40 arable, farming only on this portion, rest veld soil higher up is acid/All year round gravity fed water from mountain with dam/ baboons target vegetable crops.**
Are your technology endowments appropriate to the scale of your natural endowments: Ploughs, pumps, boreholes, tractors, transport, planters, and harvesters. **Yes, tractor, mower, baler, trailer, bakkie**.

What do you farm: **Tobacco, Lucerne, Vegetables, Sheep**
What is your input cost: **Diesel R4 000, Elec R800, own feed, Seed R10 000, Fertiliser N and Ph R30 000 – R50 000, pesticides none, Domestic R3 000**
What is your production income: **R200 000 - R300 000**
How many beneficiaries share the land and what is the average subsistence income required per beneficiary: **NA**
Do you compost: **Tobacco stems are thrown into kraals and trampled into manure, before being used on fields**
Other
Interviewer observations: **environment, tech, social dynamic, productivity.**
Good farm perhaps farming goats on the veld areas
Questionnaire Detailed
Approx distance to closest town **50km**
Average district farm size **Varies**
Value of grant **No grant**

How many beneficiaries share land **NA**
Beneficiaries available for interview
Beneficiary interview
Do you farm for money or for self-livelihood: **Livelihood**
Does farm owner live on the farm: **Yes**
Government support: **None, white owner**
Farm size: **240 hectares**
Describe farming system detail: **Crop rotation - Lucerne, tobacco, cabbage, pumpkin, sheep**
Percentage land allocated, subsistence or cash crop, motivation of choice: Grazing, Fruit, Vegetables, Fuel wood, Other. **Grazing 20% Lucerne5% Tobacco5% Fuelwood 10%**
How do you recycle your waste, compost: **Manure on fields**
Inputs estimate Rand values: **See above**
Top seven constraints motivations ideal solution: Land size, Transport, Pests, Inputs, Water, Cash flow, Infrastructure, Market access, Market value: **No constraints**

Farming for Money
Cost saving ideas: **Manual bulb sorter for onions, Drip irrigation system**
Commercial ideas/challenges: **Money management and planning, stay out of debt**
How would an integrated farming approach improve your farming conditions
Other points: **Farm less and farm cheap, plant according to what you know you can irrigate so that you not caught out by drought. Instil mutually beneficial arrangements viable for both farmers like letting neighbour graze lucerne at the average bail cost, saves both parties. Minimum wage R320/week plus house**.
Interview 03
Date: **21 July**
District: **Oudtshoorn**
Farm name: **Matjiesrivier**
Farms Map reference: **34**
How many beneficiaries share land: **1**
Status Name and contact of beneficiary available for interview: **Simon Airies Farm owner**

Tel 0442728030
Beneficiary interview
Agrarian history: **Many generations of coloured folk managed to retain their land during the group areas act. He inherited farm from his oupa.**
What are your environmental endowments: **soil/falling water/land size/aspect/flora and fauna/proximity to threats: 20 hectares/good soil/channelled water from the mountain/baboon steel food crops and jackals take a few sheep.**
Are your technology endowments appropriate to the scale of your natural endowments: Ploughs, pumps, boreholes, tractors, transport, planters, harvesters: **Yes, bakkie, tractor, plough, mower, trailer, grader.**
What do you farm: **Goats, sheep, dairy cows, chickens, lucerne, kitchen garden.**
What is your input cost: **Seed R10 000, Diesel ?, own feed, wages R2 500, Domestic R800**
What is your production income: **R8 000/month for milk, plus R2 000 other**
How many beneficiaries share the land and what is the average subsistence income required per beneficiary: **1**
Do you compost: **Kraal manure with tobacco stalks**

Other
Interviewer observations: **environment, tech, social dynamic, productivity.**
A very good example maximum productivity of all land types available, goats on his veld. Not very communicative.
Questionnaire Detailed
Approx distance to closest town: **50km**
Average district farm size: **Over 200 hectares**
Value of grant: **No government support**
How many beneficiaries share land: **N/A**
Beneficiaries available for interview
Beneficiary interview
Do you farm for money or for self-livelihood: **Livelihood**
Does farm owner live on the farm: **Yes, surrounded by his kraals**
Describe farming system detail: **Complex use of grazing land, with growing lucerne to cover winter months, using cattle, sheep and goats on various grades of grazing,**

growing all feed, putting manure back on the land, with no input of bought inputs such as fertiliser.
Percentage land allocated, subsistence or cash crop, motivation of choice: Grazing , Fruit, Vegetables, Fuel wood, Other: **10 goats on veld/4 hectares for Lucerne/ 18 cows/40sheep/ 10x10 kitchen garden potatoes, onions, pumpkin, green beans, beetroot.**
Top seven constraints motivations ideal solution: Land size, Transport, Pests, Inputs, water, Cash flow, Infrastructure, Market access, Market value**: None**
Interview 4
Date: **22 July**
District: **Oudtshoorn**
Farm name: **Matjiesrivier**
Farms Map reference: **Portion of farm 34**
How many beneficiaries share land: **1**
Status Name and contact of beneficiary available for interview: **Jerold Wicomb Farm owner**

Beneficiary interview
Agrarian history: **Categorised coloured but managed to keep their land during Apartheid era**.
What are your environmental endowments: soil/falling water/land size/aspect/flora and fauna/proximity to threats: **7 Hectares half-good soil, half not so good, channelled water but share quota not sufficient to irrigate more than a hectare, baboons are a problem.**
Are your technology endowments appropriate to the scale of your natural endowments: **Ploughs, pumps, boreholes, tractors, transport, planters, harvesters…: A Bakkie, tractor and plough, government provided a bailer, tractor, mower, which is available communally for rent**.
What do you farm: **Ostrich, cows, sheep, vegetables, feed crops.**
What is your input cost: **Diesel R1 500, Domestic R1 500, Feed own, Seed 1 500, wages none, water R80, Elec R300**
What is your production income: **Ostrich R7 000/year, Cows R15 000/year, Sheep is reserve cash.**
Do you compost: **Kraal manure goes directly into soil**
Interviewer observations: **environment, tech, social dynamic, productivity: A good looking operation although working at the very margin, water could really improve**

the system.
Approx distance to closest town: **50km**
Average district farm size: **Over200 hectares**
Beneficiary interview
Do you farm for money or for self-livelihood: **Livelihood**
Does farm owner live on the farm: **Yes surrounded by Kraals**
Government support: **Irrigation, equipment**
Farm size: **7 hectares**
Describe farming system detail: **Grow Lucerne as much as possible, and cut every month for bailing for winter, when grazing is down, sell off animals if whether gets dry to maintain grazing, buy in 1 day old ostrich chicks, sell them after 3 months for profit, If water allows plant potatoes usually can get 1 000 packets at R10/packet if conditions good.**
Percentage land allocated, subsistence or cash crop, motivation of choice: Grazing, Fruit, Vegetables, Fuel wood, Other**: Mostly grazing and feed crops, with a half-hectare field for vegetables.**
Top 7 constraints motivations ideal solution: Land size, Transport, Pests, Inputs, water,

Cash flow, Infrastructure, Market access, Market value: **Water, he could double production if he had a dam,**
Cost saving ideas: **Barter**
Commercial ideas/challenges: **Nature determines ones income**
Other points: **Less water every year and finding it getting hotter and has to plant earlier**.
Interview 05
Date: **22 July 2011**
District: **Oudtshoorn**
Farm name: **Matjiesrivier**
Farms Map reference: **Portion of 34**
How many beneficiaries share land: **NA**
Status Name and contact of beneficiary available for interview: **James Galvin Farm owner 0824821950**
Beneficiary interview

Agrarian history: **30 sheep, 3 breeding pairs of ostrich, 5 cattle**.
What are your environmental endowments: soil/falling water/land size/aspect/flora and fauna/proximity to threats: **22 Hectares more than 50% good soil/ as well as 7 Hectares elsewhere, berg wind is a problem and 7 sheep lost to jackal/only shared water enough to irrigate 1 hectare.**
Are your technology endowments appropriate to the scale of your natural endowments: **Ploughs, pumps, boreholes, tractors, transport, planters, harvesters…: Has bakkie, tractor, plough, grader, and access to governments implements mower, baler, tractor for hire. Borehole pump is not sufficient to irrigate fields**
What do you farm: **Ostrich chicks, sheep, lucerne summer, hay winter**
What is your input cost: **Diesel R1 000/month, Feed own grown, Fertiliser per year R8 000/Domestic R2 500/Labour R3 000 per month/ Seed per year R6 000, Elec R150**
What is your production income**: R30 000 - R60 000**
Do you compost: **Uses manure**
Interviewer observations: **environment, tech, social dynamic, productivity**.
Nice land, fields green, water is a big problem keeping irrigated lands down to a hectare and stifling productivity.

Beneficiary interview
Do you farm for money or for self-livelihood: **Both**
Does farm owner live on the farm: **Yes**
Government support: Implements and irrigation
Describe farming system detail: **Use animals to clean up a hectare, fertilise and plant tobacco then move to next patch, follow tobacco with Lucerne and bale for the winter, plant hawel for winter grazing. Buy in one-day-old ostrich chicks and leave them with 2 breeding pairs for raising with restricted feeding arrangement so that adults cannot take feed, sell after 3 months. Buy in calves for raising and leave with cattle to feed off cow's milk**.
Percentage land allocated, subsistence or cash crop, motivation of choice: **Grazing, fruit, vegetables, fuel wood, other.**
Top seven constraints motivations ideal solution: **Land size, Transport, Pests, Inputs, water, Cash flow, Infrastructure, Market access, Market value. Water only for 1 of 22 hectares**
Cost saving ideas: **Work yourself as labour**.
Commercial ideas/challenges: **Diversify, such as honey**.
Other points: **Farmer felt that newcomers in the district wanted to try and force him off**

his land by clamping down on his access to water.

Beneficiary interview

Do you farm for money or for self livelihood: **Both**

Does farm owner live on the farm: **No**

Government support: **No**

Farm size: **1 hectare (goats graze mountainside)**

Describe farming system detail: **All waste goes to pigs, kraal manure onto lands, prefers not to raise kids as it takes too long to milk mature so sells kids at around 25kg at R25/kg. Buys in milk goats for R1 000/goat which pays itself off in 6 weeks (4l/day = 120l in 6weeks = 12 kg cheese R150/kg = R1 800. All spare cash goes into cows, heifer is a great investment, barters every second calf for grazing land with other farmers so 1 calf a year fetches R3 500/weiner is 100% return on investment. Gets milk all year round with cows producing in the winter and goats having kids around August.**

Percentage land allocated, subsistence or cash crop, motivation of choice: **Grazing, Fruit, Vegetables, Fuel wood, Other: 80% grazing 20% subsistence, infrastructure, shop, homestead.**

Top 7 constraints motivations ideal solution: **Land size, Transport, Pests, Inputs, water, Cash flow, Infrastructure, Market access, Market value**. **Land access, All produce is sold from site directly to public**.

Commercial ideas/challenges: **Diversify, must sell directly to public. Avoid a**

middleman. Buys in other products R50 000 worth of Kudu Salami which is sold on. Hard work and flexibility.

How would an integrated farming approach improve your farming conditions: **Is an integrated approach diversity as protection against failure and attractor of client base.**

Other points: **Nguni cattle are great for veld and disease resistance but the bone/meat ratio is poor so dealers can't really sell them onto feed lots or abattoirs.**

Interview 06

Steyterleville Location

Farm

Date:

District: **Willowmore**

Farm name: **Baviaans Commodity Groups**

Farms Map reference

Status Name and contact of beneficiary available for interview: **Margarat Miggels Chairperson, Jimmy Miggels 1 of 9 boer goet farmers, George Daniels piggery, Fikile Faans Blou vegetable farmer**

Beneficiary interview
Agrarian history: **All farmers come from generations of labour from white commercial farmers especially since the 1913 land act removed their rights to their own agricultural land.**
What are your environmental endowments: **soil/falling water/land size/aspect/flora and fauna/proximity to threats. Access to water is a problem. The piggery has not the land to grow fodder for the scale of the operation. The vegetable garden has to pay for municipal water. The goat commonage has limited water but soils are overgrazed, people not of the project are grazing there, stray dogs and jackals kill 50 animals per year and another 50 lost to theft. At present 100 goats officially grazing area**.
Are your technology endowments appropriate to the scale of your natural endowments: **Ploughs, pumps, boreholes, tractors, transport, planters, harvesters…: The goat project has a solar bore hole and inadequate fencing but not enough for containment and rotation. The piggery has fencing and buildings but no equipment butchery is available for use. The vegetable garden has fencing, greenhouse irrigation and rudimentary implements in all cases the scale is manageable but water and land size is a common limitation**.
What do you farm: **Meat goats, pigs, and a diversity of vegetables**.
What are your input costs: **Goat operation costs 1500 domestic, 150 labour, R200 municipal pounding, R300 electricity. Piggery fuel R200, Domestic R2 000, Feed 1600 (government supply just finished). Vegetable garden total water bill R800**.

What is your production income: **Goat operation. Castrated Goats sold at 1 year, 18 per year yields R20 000 for Jimmy Miggels alone.The piggery sells 4 pigs per year yielding R8 000 for George Daniels olone. The vegetable garden yields an average of R100 per month for Fikile Blou alone**
How many beneficiaries share the land and what is the average subsistence income required per beneficiary: **Goats 9 working, Piggery 1, Vegetable garden split up between groups who run each section communally**.
Do you compost: **Goat operation composts. Piggery applies liquid manure directly onto crops. Vegetable garden composts**
Other
Interviewer observations**: environment, tech, social dynamic, productivity. The Piggery has no food to feed the 8 pigs and 10 piglets. There is no connectivity between projects which could render them sustainable**.
Beneficiary interview
Do you farm for money or for self-livelihood: **All for both**
Does farm owner live on the farm: **None**
Government support: **Goat farmers, fencing, solar pump, breeding stock**
Farm size: **Goat commonage 1326 hectares, piggery 1 000 square metres, vegetable**

garden half hectare
Describe farming system detail: **Goat operation. Kids stay at the house and are fed by mothers' milk, adult goats go out to commonage during the day and come home on their own at the end of the day. Piggery relies on government feed and odd food scraps, limited Lucerne and vegetables grown on site no water available Vegetable garden is organic vegetables only.**
Top seven constraints motivations ideal solution: Land size, Transport, Pests, Inputs, water, Cash flow, Infrastructure, Market access, Market value: **Goat operation is limited by cash primarily. Piggery by access to feed. Water. Vegetable garden access to compost, and costly water. In all cases the local market provides more than sufficient demand**.
Cost saving ideas: **Goat operation could bring down pounding cost. Piggery could source waste feed such as school feeding programme, restaurant waste**.
Commercial ideas/challenges: **Integrate all three programs so that waste streams feed into each other. Build a micro abattoir for hygienic processing and value adding products. Centralise operations for convenience of linkages**.
How would an integrated farming approach improve your farming conditions: **Tremendously**
Other points: **Jimmy Miggels says that Apartheid systems continue to indoctrinate people that huge game reserves are insulting to the poor of the locations, that single white farmers often own multiple farms of 1 000nds of hectares. You can't just import systems from other countries one needs to change the systems stifling access to**

land from within. Steytlerville is agricultural land with no industry how can the people then make a living without access to agricultural land.
Interview 07
Date: **29 July 2011**
District: **Uniondale**
Farm name: **Humandale Allotments**
Farms Map reference
How many beneficiaries share land
Status Name and contact of beneficiary available for interview: **Willem Macclun, small farmer 1 hectare irrigated vegetables and communal veld (70 Hectares overgrazed not irrigated) 158 sheep, 7 horses, claims to run at a loss. John Meiring tell 0447631439, 1 Hectare irrigated vegetables, 3 cows for meat, 6 horses for ploughing, claims to run at a loss. Johannes Esau tell 447631439, 3/4 hectare vegetables barter vegetables to pay rent, claims to run at a loss. Lewellen November, 1 Hectare vegetables 5 cows on veld, 1 draft horse. Claims to run at a loss. Erol March 0732180345 1 Hectare Vegetables, 19 cows, 5 horses in the veld. Claims to run at a loss. Elizabeth Kapank Tel0724468414, three hectares vegetables, 3 draft horses. Claims to run at a loss. Frederic Kapak 0722898417, one and half hectares vegetables 11 cows 3 horses, 3 pigs 3 chickens, claims to run at a loss. William Draai, 0840318322, 2 Hectares vegetables, 9 meat cows and 2 horses on veld, Pays his**

corporation account with vegetables but claims to be making a living.
Common limitations: **No local market and limited transport for produce to distant buyers in George 150 km away. Everyone has the same crops at the same time of year. Often available ground needs to be rented far from the homestead. Not allowed to slaughter for local sale without a stamp so have to sell animals cheap or self consume whole animal. Cannot rotate crops as everyone has too little irrigated land. Poor grazing means dairy is not a possible alternative income. The water available on the communal veld is too expensive to be viable.**
Beneficiary interview Detailed
Interviewer making a living off land: **William Draai 0840318322, Merinda Draai 0832779329, Mixed veg, 8 cows, 2 horses, 4 pigs**
Agrarian history: **Self-taught, but completed short courses in management, marketing, and experience and references in fruit farming**.
What are your environmental endowments: **soil/falling water/land size/aspect/flora and fauna/proximity to threats: 2 Hectares irrigated land, access to 70 hectares commonage veld**
Are your technology endowments appropriate to the scale of your natural endowments**: Ploughs, pumps, boreholes, tractors, transport, planters, harvesters…: Draft ploughs and cultivators; irrigation equipment, barn**.
What do you farm: **Mixed vegetables, meat cows, pigs**.

What is your input cost: **Fuel R800/month. Domestic consumables: R1600/month. Feed: 460/month. Fertiliser Vet: 400/year. Seed: R250/year. Wages: R2600/year. Electricity: R350/year. Calves: 800/year. Land rental: 3130/year**.
What is your production income: **Vegetables R35 000 cows sold R17 500**
Do you compost: **No animals stay mostly on veld, sometimes when they are in paddocks manure is collected**.
Other: **Also buys in produce such as fruit from local farmers to sell directly to vendors in Uniondale and George, not viable to sell on the main market**.
Interviewer observations: environment, tech, social dynamic, productivity: **Good management practice, the beginnings of record keeping, No Kraal means input costs are way too high.**
Beneficiary interview
Do you farm for money or for self livelihood: **Both**
Does farm owner live on the farm: **Most land rented nearby**.
Government support: **Yes was part of collective 50 who received a commercial farm but fruit trees were old and there was no capital to run the operation so farm was sold back to commercial farmer for 6,5 Million rand.**
Describe farming system detail: **Irrigated lands are tilled with draft horses and planted**

with seasonal veg or left fallow for grazing, Fertiliser is applied before planting, and cows are left in the veld and sold when extra cash is needed. Percentage land allocated, subsistence or cash crop, motivation of choice: Grazing, Fruit, Vegetables, Fuel wood, Other. Land is rotated emphasis on vegetables for market and grazing.
How do you recycle your waste, compost: **No evidence of proper composting**
Top seven constraints motivations ideal solution: Land size, Transport, Pests, Inputs, water, Cash flow, Infrastructure, Market access, Market value. **High input costs, enough good grazing, cash flow, transport costs**.
Cost saving ideas**: Sell directly to hawkers and get a better price, keep cattle for sale in lean times**.
Commercial ideas/challenges: **Buy produce from other farmers to sell to hawkers**.
Other points: **Hard work is essential, commitment, reliability and team work with the rest of the family**.

Appendix 6: List of all interviews held and contact details

Name	Function and organization	Contact details	Date
M. James Engel	Deputy Director of Community Services Swellendam Municipality	0285148532	09/09/11
M. Willie Hattingh	Town Planning and Building Control Official, Swellendam Municipality	0285148532	09/09/11 28/05/12
M. Piet Uys	Biological farmer Foundation for Farming	0823163214	28/05/12
M. Christi Lawrance	Land Care Swellendam	Christiel@elsenburg.com Tel 0829091694	28/05/12
M. Ernest Guder	Agricultural Advisor in Oudtshoorn (facilitating local land reform)	Tel 0442726077	20/09/11
M. Johannes Coetzee	Small-scale farmer	No number given	20/09/11
M. Francois De Kock, owner,	Small-scale farmer	Tel 0442725660	21/09/11
M. Simon Airies Farm owner	Small-scale farmer	Tel 0442728030	21/09/11
M. Jerold Wicomb	Small-scale farmer	No number given	22/09/11
M. James Galvin	Small-scale farmer	Tel 0824821950	22/09/11
Ms Margarat Miggels M. Jimmy Miggels M. George Daniels Ms Fikile Faans Blou	Baviaans Commodity Groups farmers	No contact given	24/09/11
M. Willem Macclun	Small-scale farmer	No contact given	24/09/11

Other contact details given for follow-up interviews:

- Ian Blanchor 0214834797
- Marius Swart 0285141182 0824962277
- Lauraine Venter 0285148510

Appendix 7: Original farm layout drawings from 2009

Figure 4: Original farm layout design featuring proposed permaculture Zones

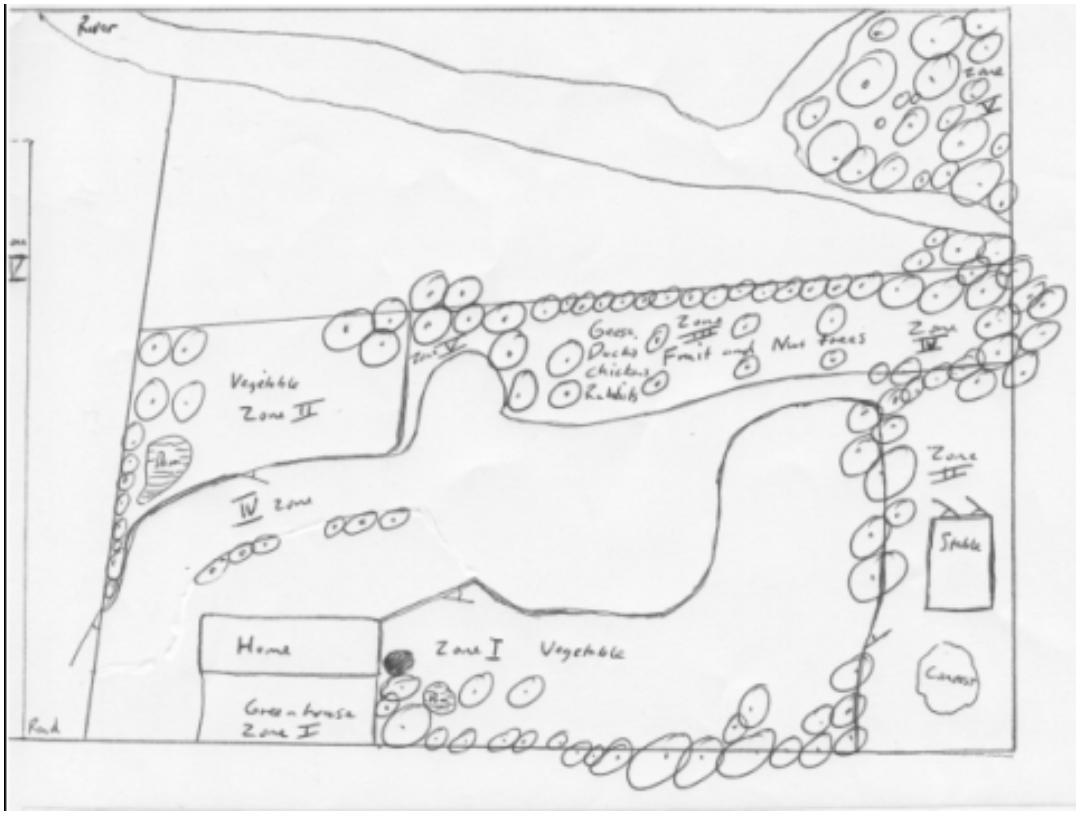

Figure 5: Originally conceived 'Bio-Resource Flow Model' (Lightfoot Noble in Devlin & Zettel 1999)

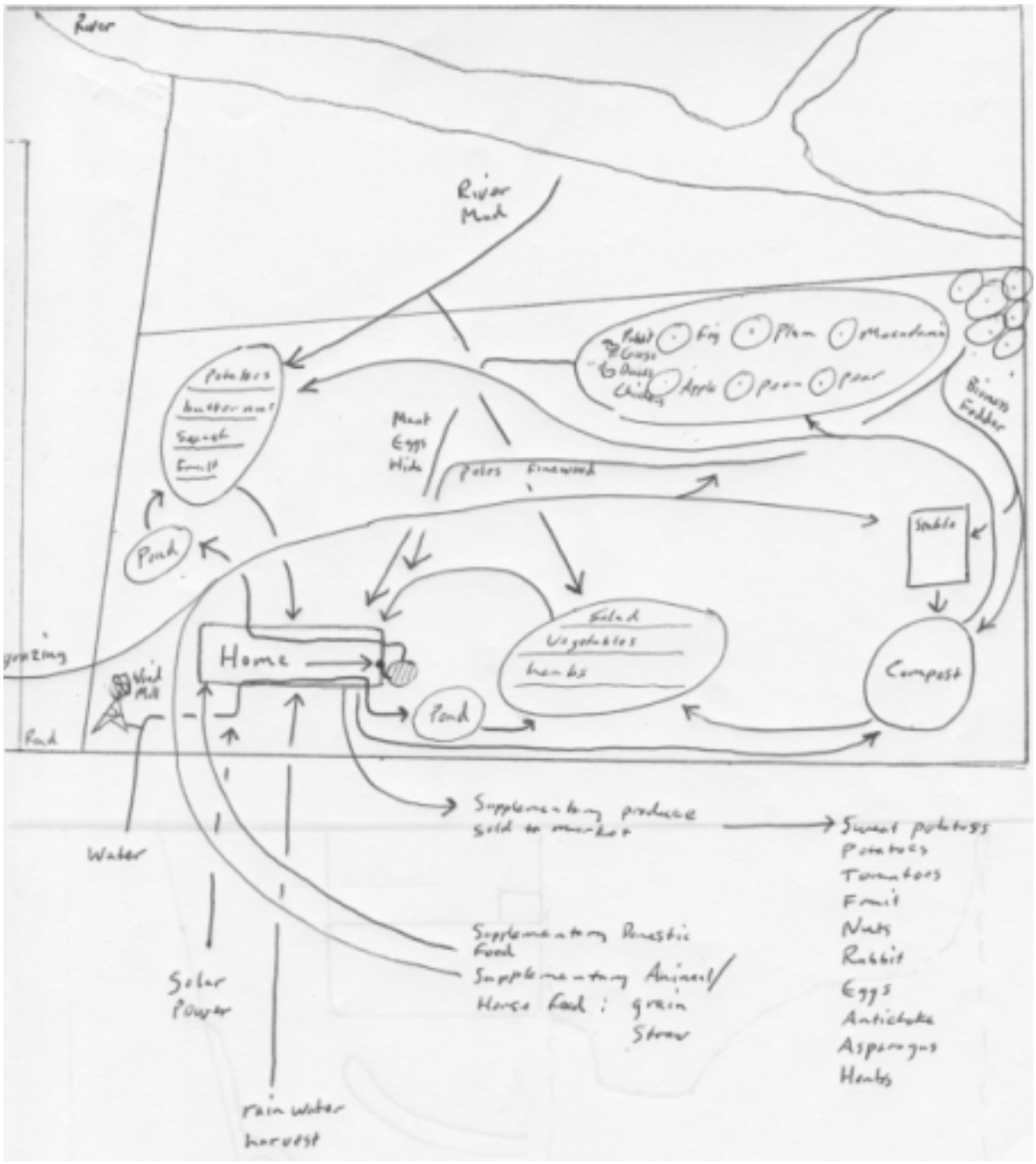

Figure 6: Original plot drainage plan

Key:

S-Swales

→ Flood surface flow

D-Water catchments

W-Rainwater storage

Appendix 8: Photographs of the Suurbraak niche settlement

Suurbraak: an agri-village

Farming allotments viewed from the Langeberg mountian

The case study site

Demarcated area showing the 1 000 square meter plot nestled

Building one's dwelling

Building with local materials

House fitting into the natural topography

Home nestled in ecology

Harvesting one's food

A functional cottage industry pantry

Food to be trusted.

Gorilla farming.

Small livestock coexistence.

Dairy – British Alpine goats.

Harvesting one's energy

Off-grid energy.

Harvesting one's waste

Safe composted human manure.